# The BULLETIN

## American Society of Hospital Pharmacists

**PESTICIDES**
*chemistry, toxicity and therapeutic properties*

**JOB DESCRIPTIONS**
*for chief pharmacist and pharmacy helper*

**A MODERN PHARMACY**
*for a small hospital*

**INCREASING PROFESSIONAL SERVICE**
*reports on new drug products*

℞ VOLUME 9 NUMBER 3 MAY-JUNE 1952

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# The BULLETIN
## American Society of Hospital Pharmacists

MAY-JUNE 1952
VOLUME 9 NUMBER 3





MEMBERSHIP in the American Society of Hospital Pharmacists and the American Pharmaceutical Association is open to all practicing Hospital Pharmacists. With membership is included subscriptions to THE BULLETIN of the American Society of Hospital Pharmacists and to the two *Journals* of the American Pharmaceutical Association, as well as the several services of both organizations.

ADVERTISING is accepted from those firms currently advertising in the *Journals* of the American Pharmaceutical Association. In addition, advertising for special equipment and material will be accepted. Inquiries should be sent to the Division of Hospital Pharmacy, American Pharmaceutical Association, 2215 Constitution Ave., N.W., Washington 7, D.C.

SUBSCRIPTION RATE: In the U.S. $4.50 per year (six issues), single copies 75 cents; Foreign $5 per year, single copies 85 cents. CHANGES OF ADDRESS should be directed to the Division of Hospital Pharmacy, American Pharmaceutical Association, 2215 Constitution Ave. N.W., Washington 7, D.C




The American Society of Hospital Pharmacists, an affiliate of the American Pharmaceutical Association, is a national organization devoted to the profession of hospital pharmacy and dedicated to the interests of the hospital pharmacist.

## IN THIS ISSUE




THE BULLETIN is published bimonthly at Hamilton, Illinois, by the American Society of Hospital Pharmacists in cooperation with the Division of Hospital Pharmacy of the American Pharmaceutical Association. Editorial office at 1313 East Ann Street, Ann Arbor, Michigan. Entered as second class matter July 19, 1951 at the post office at Hamilton, Illinois. CONTRIBUTIONS will be accepted if they are of general interest to those in hospital pharmacy. The editors reserve the right to revise all material submitted, if necessary. The American Society of Hospital Pharmacists and the American Pharmaceutical Association assume no responsibility for the statements and opinions advanced by contributors to THE BULLETIN. Views expressed in the editorials are those of the editor and do not necessarily represent the official position of either the American Society of Hospital Pharmacists or the American Pharmaceutical Association.


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**To the A S H P**

DEAR SIRS: Your kindness in forwarding the resolution commending the Public Health Service "for its efforts in aiding and improving the practice of pharmacy by developing plans for hospital pharmacy facilities, and the suggested equipment list and the model pharmacy" is greatly appreciated.

This action of the American Society of Hospital Pharmacists makes all of us feel quite proud. The members of this staff who have contributed to this work have been advised of the resolution and were quite pleased.

Again accept our thanks.

JOHN W. CRONIN, *medical director*
*Chief, Division of Hospital Facilities*
*Public Health Service*
*Washington, D. C.*

**Clinic Pharmacies**

DEAR SIRS: Just read your editorial, "Clinic Pharmacies and the Profession." It is fine . . .

TROY L. CARTER, JR., *chief pharmacist*
*Veterans Administration Hospital*
*New Orleans, La.*

DEAR SIRS: Your editorial on "Clinic Pharmacies and the Profession" which appeared in the November-December issue of THE BULLETIN, was of interest to me. We have been troubled by many physician-owned pharmacies in clinics or medical buildings but as far as I know now, we do not have any operating as physician-owned at this time.

Our Bureau of Professional Relations, which is in a unique situation, has helped to abolish them. At one time it was one of the bitterest complaints the Florida pharmacists had to offer. As Associate Director of the Bureau, I visited these clinics or groups of doctors, emphasizing that such pharmacies were against the ethics of the A.M.A., reminding them that the A.Ph.A. through a resolution had called this to the attention of the medical organizations, and that local pharmacists were rebelling against such and refusing to refer patients to them. I also emphasized the fact that they were breaking up the good will which we were trying to maintain to strengthen the relationship between the two professions. These points with a little discussion on Socialized Medicine and a few other things thrown in for a good measure have persuaded these physicians to sell their stores during the past year. We are now concerned with small private hospitals which maintain doctors' offices and drug rooms without pharmacists and which require their patients to buy medications from the drug rooms. A few physicians who sell their own medications have brought us concern also. The drug inspectors, however, are watching these physicians closely and I believe there will be a change in the near future.

CHARLES S. HAUPT, *associate director*
*Bureau of Professional Relations*
*University of Florida*
*College of Pharmacy*
*Gainesville, Fla.*

**Administrator Interested**

DEAR SIRS: The excellent article entitled "Hospital Pharmacy Management" which appeared in the September-October issue of THE BULLETIN has been brought to my attention. Please allow me to congratulate you. I would appreciate receiving samples of the forms and also copies of the reprint, if available.

W. DEACHSEL, *administrative resident*
*Kingston General Hospital*
*Kingston, Ontario, Canada*

**Appreciate Formularies**

DEAR SIRS: I want to thank you for the use of the very fine formularies recently sent to me. They were of great assistance and I believe that our hospital will certainly benefit from their use.

R. DAVID ANDERSON, *chief pharmacist*
*King's Daughters' Hospital*
*Staunton, Va.*

DEAR SIRS: Thanks for sending us the material on hospital formularies. I was particularly impressed with the work done at Beth Israel Hospital in New York City and I have contacted their pharmacist. He will be very helpful to us in working out our own formulary.

WILLIAM A. KELLY, M.D., *director*
*The Mount Vernon Hospital*
*Mount Vernon, N. Y.*


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EDITORIAL

# ASHP Decennial Year

*by* DON E. FRANCKE

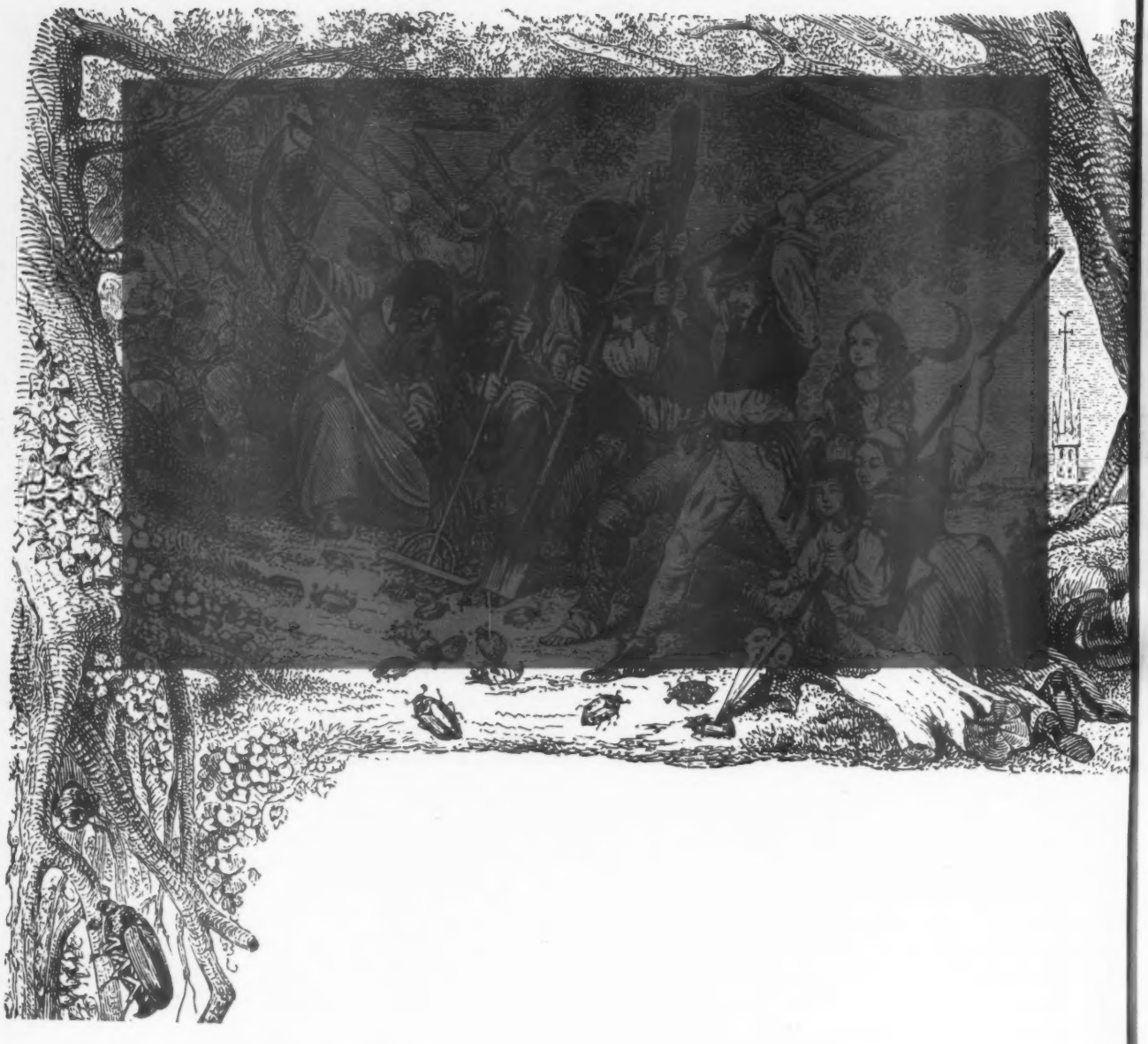
August 1952 marks an important milestone in the march of the American Society of Hospital Pharmacists. In this, its Decennial year, the officers and members of the ASHP may view the record of the past ten years with justifiable pride. Many have been its accomplishments but the greatest of these remains the splendid spirit of the Society. A spirit which provides an environment in which each individual feels encouraged to contribute to the advancement of his chosen profession according to the best means at his command. A spirit of unselfish cooperation which recognizes that the success of the Society has been and will always be the result of efforts of hundreds of individuals working toward a common objective—a spirit of professional service which rises above all else, that pharmacy in hospitals may contribute an ever expanding service toward the total care of the patient.

It is unusual that the ASHP has the opportunity to celebrate its Decennial at the Centennial Convention of the American Pharmaceutical Association. This gives the Society the opportunity not only to commemorate its own founding but also to felicitate the A.Ph.A. upon its century of progressive action. More and more, all pharmacists are beginning to appreciate more fully the significance of the role the A.Ph.A. has played and continues to play in American pharmacy. They know now, more than ever before, that the future of professional pharmacy lies in successful implementation of the program of the A.Ph.A. Hospital pharmacists by their continual and increasing support of the Association are making vital contributions to the progress of professional pharmacy in all areas.

Your officers and committees have planned several significant events for the Decennial Convention. Many of these have been made possible by your enthusiastic response with contributions to the Society's Decennial Fund. This Fund was established by President Walter Frazier in the farsighted recognition that this is not only the convention of a decade but in addition it is the convention of the century. As such, it is at once a privilege and an obligation not only to make the Society's program an outstanding one, but also to blend it in such a manner that our program will also be a contribution, at least in a small way, to the greater Centennial Celebration of the American Pharmaceutical Association, our parent organization. Those of you fortunate enough to be in Philadelphia during August 17-22 this year will be participating in an historical event which you will remember always.

Several outstanding events have been planned by your Program Committee headed by Allen V. R. Beck. One of these is the participation of foreign hospital pharmacists in the program of the ASHP by giving papers at its sessions and thus bringing to our members talks of unusual interest as well as a broader perspective of hospital pharmacy practice in other countries. Another is the special Decennial Issue of THE BULLETIN which will contain the history of the Society as well as a large number of outstanding articles reflecting the development of hospital pharmacy during the past decade. The history, *Ten Years of the American Society of Hospital Pharmacists,* has been written by Gloria Niemeyer, ASHP Secretary, and Alex Berman of the American Institute of the History of Pharmacy. As a contribution to the A.Ph.A. Centennial, your officers have planned to give a copy of this special Decennial issue of THE BULLETIN to each pharmacist registering at the convention.

This year the traditional ASHP breakfast will be sponsored by the Philadelphia Society of Hospital Pharmacists whose officers have been actively planning with ASHP officials details of this event as well as others, including the banquet, tours of hospital pharmacies, and so forth. Culminating the convention activities will be the ASHP banquet on Friday night. At this affair will be many distinguished guests including members of the A.Ph.A. Council; numerous foreign delegates; officers of related professional organizations; past, present, and incoming officers of the Society; and, most important, a large number of ASHP members. The theme of the banquet will be *Ten Years of the American Society of Hospital Pharmacists.* Make your plans now to be in Philadelphia August 17-22.



# THE CHEMISTRY AND THERAPEUTIC PROPERTIES OF ORGANIC-PHOSPHORUS-CONTAINING INSECTICIDES

*by* KENNETH DUBOIS

DURING THE LAST DECADE remarkable progress has been made in the development of insecticides and a large number of new chemical agents are now being employed throughout the world for the eradication of destructive insects. The economic value of these new compounds has been well-established and it is now generally recognized that marked increases in crop yields can be obtained by the use of the new insecticidal agents. In addition, the control of diseases ordinarily transmitted by insects has been greatly improved during recent years by the use of new insecticidal compounds. Thus, while certain toxicological problems accompany the use of most of the insecticides it seems worthy of emphasis that the bene-

*The experimental work described in this paper was supported in part by a research grant from the National Institutes of Health, U. S. Public Health Service.

KENNETH P. DUBOIS is in the Department of Pharmacology, University of Chicago, Chicago 37, Ill.

*three articles on the subject of*

# *PESTICIDES*

*Presented at Symposium conducted under the auspices of the American Medical Association's Committee on Pesticides, 1951 meeting of AAAS, Philadelphia, Pa.*

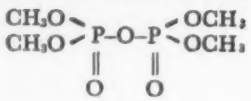
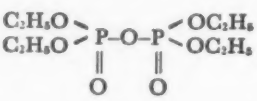
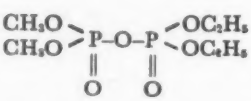
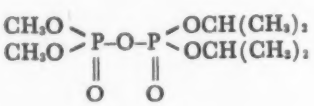
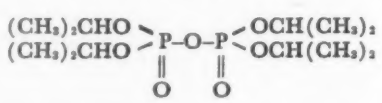
ficial effects of these materials greatly exceed their harmful properties. Recognition of the toxicological hazards and judicious use of the new insecticides will greatly reduce the incidence of accidental poisoning. To accomplish the safe use of insecticidal agents it is important to investigate the toxicology and pharmacologic actions of each new group of compounds in order to properly evaluate the potential hazards associated with their use.

The organic phosphorus-containing insecticides represent a new group of toxicants which has attracted a great deal of attention during the past six years. These insecticides were developed by Schrader[1] in Germany and were introduced into this country in 1946. They are now widely used as agricultural insecticides because of their effectiveness against a variety of harmful insects including some species which are resistant toward DDT. The high inherent toxicity of the organic phosphates and the lack of substantial differences in the toxicity of these compounds to mammals and insects emphasizes the necessity of obtaining a thorough understanding of the effects of these agents on man and domestic animals. As a result of research conducted during the past six years it is now possible to define rather precisely the principal actions of this group of compounds on mammals. Progress has also been made in the treatment of accidental poisoning and in the development of protective measures to prevent accidental poisoning during the use of these materials. Information on the practical aspects of the toxicology of organic phosphorus-containing insecticides to man and domestic animals has recently been presented in publications by the Committee on Pesticides of the American Medical Association[2] and by Bidstrup[3] and Barnes[4] in Great Britain.

## MECHANISM OF TOXIC ACTION

Studies on the mechanism of the toxic action of organic phosphorous-containing insecticides were initiated in this laboratory in 1947[5] with an examination of the toxicity and actions of hexaethyl tetra-phosphate (HETP) in experimental animals. This was the first organic phosphate to be used for insecticidal purposes in this country. We observed[5] that HETP produced symptoms resembling those which result from excessive stimulation of the central and peripheral nervous system. Salivation, involuntary defecation, muscular twitching, and tonic and tonic-clonic convulsions were observed. These symptoms are characteristic of those resulting from stimulation of the central nervous system, skeletal muscles, smooth muscles and secretory glands. These effects indicated that HETP increases the activity of structures supplied by cholinergic nerves. When these nerves are stimulated acetylcholine is liberated at the nerve endings and serves as a chemical stimulus which reacts with some component of muscle or glandular tissue. The result of this series of events is a stimulation of the functional activity of the tissues. Immediately after acetylcholine is liberated and performs its stimulant action it is normally inactivated through enzymatic hydrolysis. This hydrolysis of acetylcholine to acetate and choline is catalyzed by an enzyme, cholinesterase, which is present in high concentrations at nerve endings where acetylcholine is liberated. The ability of toxicants to produce excessive activity of structures innervated by cholinergic nerves

TABLE 1—TOXICITY AND ANTICHOLINESTERASE ACTION OF ALKYL PYROPHOSPHATES

| COMPOUND | STRUCTURAL FORMULA | INTRAPERITONEAL LD–50 FOR MICE (MG./KG.) | MOLAR CONCENTRATION FOR 50% INHIBITION OF CHOLINESTERASE *in Vitro* |
|---|---|---|---|
| Tetramethyl pyrophosphate |  | 1.7 | $1.8 \times 10^{-8}$ |
| Tetraethyl pyrophosphate |  | 0.85 | $4.0 \times 10^{-9}$ |
| Dimethyl diethyl pyrophosphate |  | 1.1 | $8.0 \times 10^{-9}$ |
| Dimethyl di–isopropyl pyrophosphate |  | 2.5 | $2.0 \times 10^{-7}$ |
| Tetraisopropyl pyrophosphate |  | 16.0 | $1.4 \times 10^{-6}$ |

may result from either of two possible mechanisms. Thus, there may occur an increased liberation of acetylcholine due to a direct stimulant action of the poison on nervous tissue or acetylcholine may be liberated in normal quantities but its inactivation through enzymatic hydrolysis may be blocked by the toxicant resulting in an accumulation of acetylcholine in the tissues with consequent prolonged and intensified activity of structures which are capable of responding to the stimulant action of acetylcholine. From observations on the symtoms in animals poisoned with HETP we suspected that this compound produced its cholinergic action by inhibition of cholinesterase activity.

Measurements of the effect of HETP on cholinesterase showed[5] that this material is a very effective inhibitor of this enzyme. It produced 50 percent inhibition of cholinesterase activity *in vitro* at a final molar concentration of $1.6 \times 10^{-8}$ and was similarly effective as an inhibitor of insect cholinesterase. Assays performed on tissues taken from animals poisoned with HETP demonstrated that lethal doses of this compound produce nearly complete inhibition of the cholinesterase activity of several tissues with the resultant accumulation of acetylcholine in the tissues. This demonstration of the strong anticholinesterase action of HETP on both mammalian and insect cholinesterase provided an explanation for the high toxicity to mammals as well as the insecticidal action of this compound. Information on the mechanism of action of HETP served as the basis for investigation on the pharmacological actions of other organic phosphates subsequently introduced into use as insecticides. In all cases this far, organic phosphates having insecticidal activity also either have the inherent ability to inhibit cholinesterase or are converted *in vivo* by plants, animals or insects into active anticholinesterase agents. At the present time three groups of organic phosphorus-containing insecticides, namely, the alkyl pyrophosphates, the alkyl thiophosphates and the phosphoramides. The individual members of each group exhibit similarities in the details of their cholinergic actions while the three classes of compounds vary with respect to duration of action and tissue distribution.

## ALKYL PYROPHOSPHATES

During studies on the anticholinesterase action of HETP evidence indicating that a rapid initial hydrolysis of this compound occurred in aqueous solutions to yield a highly toxic compound was obtained. Following this observation a number of possible hydrolysis products including tetraethyl pyrophosphate (TEPP) were obtained for toxicity and anticholinesterase measurement. Through this investigation Mangun and DuBois[6] demonstrated that TEPP, which had previously been prepared by Schrader,[1] is highly toxic to mammals, produces typical cholinergic symptoms like those resulting from administration of HETP, and exerts a potent inhibitory action on cholinesterase *in vitro* and *in vivo*. It is now generally agreed that

HETP ordinarily consists of a mixture of organic phosphates with the most active compound in the mixture being TEPP.

Following studies on TEPP we became interested in examining other alkyl pyrophosphates to observe relationships between chemical structure and biological activity. For this comparison anticholinesterase activity was measured *in vitro* and toxicity measurements were performed using mice. The results of these tests are summarized in Table 1. These data indicate that there exists a correlation between the toxicity of these compounds to mice and their inhibitory action on cholinesterase *in vitro*. These and other experiments have demonstrated that various alkyl pyrophosphates exhibit similar cholinergic properties and that the particular alkyl group determines the potency of a compound with the activity generally decreasing as the size of the alkyl group is increased.

**ALKYL THIOPHOSPHATES**

Soon after the introduction of HETP and TEPP into use as insecticides, widespread interest was exhibited in *p*-nitrophenyl diethyl thionophosphate (Parathion). The high toxicity of this compound to insects together with its greater stability than the pyrophosphates toward hydrolysis has resulted in widespread use of this material as an agricultural insecticide in this and other countries. When it appeared likely that Parathion would be employed as an insecticide detailed studies on its toxicology and pharmacology were undertaken in this laboratory.[7] These studies showed that Parathion is a strong inhibitor of cholinesterase *in vitro* and gains access to and inhibits the cholinesterase activity of all tissues *in vivo* producing generalized cholinergic effects.

The effectiveness of Parathion as an insecticide has stimulated interest in the development of other thiophosphates in an effort to obtain agents which are less toxic to mammals but retain high insecticidal activity. This effort has resulted in the introducing of several new thiophosphates including the methyl analog of Parthion (Metacide), an alkyl coumarin thiophosphate (E 838), the diethoxy thiophosphoric acid ester of 2-ethyl mercapto ethanol (Systox). and S-(1,2-dicarboxyethyl) dimenthyl dithiophosphate (4049). These alkyl thiophosphates resemble one another in several respects. Thus, they all inhibit the activity of cholinesterase *in vitro* and in toxic doses they gain access to and inhibit the cholinesterase activity of both the brain and peripheral tissues. A marked similarity in the symptoms produced by Parathion and other thiophosphates may be observed following acutely toxic doses of the various compounds. It is thus possible to state that the thiophosphates produce the same pharmocological effects in mammals and individual members of the group differ principally with respect to the dosage required to produce cholinergice actions. The data in Table 2 shows the differences in toxicity and anticholinesterase action of several of the alkyl thiophosphates.

From the data in Table 2 it may be seen that there are large differences in the toxicity of various thiophosphates to mammals. Mammalian toxicity data alone might give the impression that some of the newer thiophosphates are preferable for use as insecticides because of their lower inherent toxicity. However, this difference loses some of its apparent significance when one considers that those materials which have a low

TABLE 2—TOXICITY AND ANTICHOLINESTERASE ACTION OF ALKYL THIOPHOSPHATES

| COMPOUND | SYNONYM | INTRAPERITONEAL LD–50 FOR RATS (MG./KG.) | MOLAR CONCENTRATION FOR 50% INHIBITION OF CHOLINESTERASE *in Vitro* |
|---|---|---|---|
| *p*-Nitrophenyl diethyl thionophosphate | Parathion | 5.5 | $1.2 \times 10^{-6}$ |
| *p*-Nitrophenyl dimethyl thionophosphate | Metacide | 3.5 | $1 \times 10^{-4}$ |
| Diethoxy ester of 7–hydroxy coumarin | Potasan, E 838 | 15.0 | $5 \times 10^{-9}$ |
| Diethoxy thiophosphoric acid ester of 2–ethyl mercapto ethanol (Technical) | Systox | 3.0 | $5 \times 10^{-7}$ |
| S–(1,2–dicarbethoxyethyl) O,O–dimethyl dithiophosphate (90% technical) | 4049 | 750.0 | $1 \times 10^{-4}$ |

toxicity for mammals generally also exhibit a lower toxicity for insects thus requiring the use of higher concentrations of the insecticidal agent in the formulations used for insect control. The ideal compound is, therefore, one which has a high toxicity to insects and low mammalian toxicity. This type of differential susceptibility is currently being sought through the synthesis and testing of various new chemical compounds containing the alkoxy thiophosphate group plus additional chemical linkages which might decrease mammalian toxicity.

**PHOSPHORAMIDES**

The phosphoramides constitute the most recent addition to the expanding number of organic phosphorus-containing insecticides. These compounds have been termed systemic insecticides[1] because they are absorbed by plants rendering the plants toxic to insects. In this country octamethyl pyrophosphoramide (Schradan, OMPA) is the only one of this group which has been released for general use and it may only be employed on ornamentals to avoid the danger of food contamination. Studies in this laboratory[8] revealed that OMPA exhibits pharmacological effects which are unusual among the organic phosphates. This compound exhibits no appreciable anticholinesterase activity *in vitro* but is converted by the liver of mammals and by plants into a strong cholinesterase inhibitor. A further differentiating feature of OMPA is its inability to gain access to the brain *in vivo* and its cholinergic effects are therefore limited to peripheral tissues. In addition, OMPA is stable in aqueous solutions in contrast to the rapid hydrolysis of the alkyl pyrophosphates and alkyl thiophosphates in the presence of moisture. These unusual properties appear to be due to the presence of nitrogen-phosphorus linkages in the molecule in place of alkoxy linkages. It therefore, seemed possible that the addition of amidophosphate linkages to compounds containing alkoxy linkages might markedly modify the stability of alkyl phosphates and limit their actions to peripheral tissues. Experimental observations in this laboratory have supported this idea. The data presented in Table 3 give a comparison of the anticholinesterase activity *in vitro* and the toxicity of several amidophosphates.

The data in Table 3 show that phosphoramides which do not contain the pyrophosphate linkage are relatively inactive unless an additional constituent such as fluorine is added to the molecule. The pyrophosphoramides containing two of the ethoxy linkages of TEPP and two of the phosphoramide linkages of OMPA are strong anticholinesterase agents *in vitro* and exhibit a high toxicity to mammals. In their inherent ability to inhibit cholinesterase *in vitro* these compounds resemble TEPP and do not require conversion by the liver as OMPA does. However, in their stability toward hydrolysis, selective action on peripheral tissues and relatively long duration of action these alkoxy amidopyrophosphates closely

TABLE 3

COMPARISON OF THE TOXICITY AND ANTICHOLINESTERASE ACTION OF VARIOUS AMIDOPHOSPHATES

| COMPOUND | STRUCTURAL FORMULA | INTRAPERITONEAL LD–50 FOR RATS (MG./KG.) | MOLAR CONCENTRATION FOR 50% INHIBITION OF CHOLINESTERASE *in Vitro* |
|---|---|---|---|
| Ethyl di(dimethylamido) phosphate | $(CH_3)_2N$, $(CH_3)_2N$, P(=O)–O–$C_2H_5$ | >1500 | >1 x $10^{-2}$ |
| *Bis*(dimethylamido) fluorophosphate | $(CH_3)_2N$, $(CH_3)_2N$, P(=O)–F | 3 | 4 x $10^{-5}$ |
| Octamethyl pyrophosphoramide | $(CH_3)_2N$, $(CH_3)_2N$, P(=O)–O–P(=O), $N(CH_3)_2$, $N(CH_3)_2$ | 8 | >1 x $10^{-2}$ |
| Diethyl di(dimethylamido) pyrophosphate (Symmetrical) | $(CH_3)_2N$, $C_2H_5O$, P(=O)–O–P(=O), $N(CH_3)_2$, $OC_2H_5$ | 11.5 | 4.7 x $10^{-7}$ |
| Diethyl di(dimethylamido) pyrophosphate (Unsymmetrical) | $C_2H_5O$, $C_2H_5O$, P(=O)–O–P(=O), $N(CH_3)_2$, $N(CH_3)_2$ | 2.7 | 2.8 x $10^{-7}$ |

resemble OMPA. These investigations on amidopyrophosphates have shown that the presence of the nitrogen-phosphorus linkage imports characteristic pharmacologic properties to cholinergic organic phosphates.

## THERAPEUTIC USES

The organic phosphorus-containing insecticides have thus far been employed for the treatment of only one disease. The condition in which therapy with organic phosphates has proven efficacious is myasthenia gravis, a disease characterized by weakness of skeletal muscles. While the exact metabolic disorder in the muscles of paients with myasthenia gravis is unknown it is well-established that increasing the concentration of acetylcholine in the tissues through the use of cholinesterase inhibitors relieves the symptoms of the disease. In order to maintain an increase in the acetylcholine levels in the muscle tissue it is necessary to continue medication with an anticholinesterase agent since these compounds do not cure disease. Neostigmine has been the preferred drug for the treatment of this condition but the short duration of action of this compound necessitates its administration several times each day. For this reason drugs which have a more prolonged action have been desired and the organic phophates were therefore given consideration as therapeutic agents for the treatment of myasthenia gravis.

Several clinical studies have demonstrated[9, 10, 11] the effectiveness of TEPP for the treatment of myasthenia gravis. The longer duration of this compound as compared with neostigmine was an outstanding advantage of TEPP. However, two disadvantages of TEPP became evident during its clinical use. Toxic manifestations were frequent and the compound was rapidly hydrolyzed when exposed to moisture. When the pharmacology of OMPA was studied[8] it was observed that this compound lacked the properties which were disadvantages in the therapeutic use of TEPP but retained the desirable properties of TEPP. For this reason Rider and associates[12] initiated the clinical use of OMPA for the treatment of myasthenia gravis. It was found that OMPA could replace neostigmine in the treatment of this disease and it has the advantage that two oral doses of from 9.5 to 18 mg. a day result in evenly maintained strength which is generally greater than the maximal strength obtained with neostigmine. In addition OMPA is stable in the presence of moisture and the side-effects are less marked than resulting from administration of TEPP.

## CONCLUSIONS

The organic phophorus-containing insecticides may be classified into three groups, namely alkyl pyrophosphates, the alky thiophosphates and the phosphoramides. All of these groups of compounds owe their principal pharmacologic actions to their ability to inhibit cholinesterase thus increasing the acetylcholine content of the tissues with resultant intesified activity of structurees which are normally stimulated by acetylcholine.

The pyrophosphates and alkyl thiophosphates are active inhibitors of cholinesterase *in vitro* and inhibit the enzyme activity of mammalian and insect tissue *in vivo*. Individual members of each group exhibit similar pharmacological actions but show variations in the dosage required to elicit toxic manifestations.

The phosphoramides differ from the other groups of phosphorus-containing insecticides in exerting their effects mainly on peripheral tissues without marked stimulatory action on the central nervous system. In addition they are stable toward hydrolysis and exert a long duration of action. These properties prompted the use of octamethyl pyrophosphoramide (OMPA) for the treatment of myasthenia gravis.

While considerable progress has been made in gaining an understanding of the relationship between chemical structure and biological activity of organic phosphates, further research on this important group of compounds will undoubtedly yield much additional information of practical and theoretical value.

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# 2 THE CHEMISTRY OF SOME OF THE NEW PESTICIDES

*by* ELMER E. FLECK

THE CHEMICALS USED In formulating insecticides vary widely in homogeneity. The chlorinated hydrocarbons range from practically C.P. chemicals to very complex mixtures of compounds whose chemical structure is understood only in a general way. Although it is not necessary to use C.P. chemicals to kill insects, it is necessary to have some control over the quality of the chemicals used as pesticides. It is my purpose to review the various ways in which this quality control is maintained.

## DDT

DDT is the oldest of the pesticidal chemicals under consideration. It is made by the condensation of chloral and chlorobenzene. Figure I indicates how this reaction takes place and also shows the main products of the reaction, *p,p'*-DDT and *o,p'*-DDT, which occur in a ratio of about 3 to 1 when the reaction takes place under optimum conditions. Under conditions less than ideal the content of the half-condensation product increases. The setting point of the technical material was found to give a simple and effective check on the quality of DDT, and a specification was written around this test for use by the military forces in the procurement of technical-grade DDT. This specification has undergone many modifications and refinements, and what is now known as Federal Specification (1) O-D-370 is generally accepted as the standard by both manufacturer and user. It is a good example of a very desirable result that was obtained by general cooperation of all parties concerned.

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## BENZENE HEXACHLORIDE

With benzene hexachloride (BHC) the problem was not so easily solved. The addition of chlorine to benzene results in a mixture of five or more isomers (Fig. II), the *gamma* isomer being the one of insecticidal interest. Unlike DDT, the most desired product, the *gamma* isomer, does not have the highest setting point, but instead has the lowest. This made tests of setting point of little use, as many combinations of isomers can give setting points within the desired range. Therefore, industry-government conferences adopted analytical methods that established the *gamma*-isomer content by either a chromatographic or an infrared method,[2] and BHC is sold largely on its *gamma*-isomer content as determined by these methods.

The objectionable odor and the toxicity of some of the other isomers in BHC led to the demand for the *gamma* isomer alone to be used as an insecticide. The Interdepartmental Committee on Pest Control adopted the name "lindane" for this product, and defined it as the *gamma* isomer of a purity of not less than 99 percent. At the time of adoption there were no methods accurate enough to give control within the limits indicated by the definition, but subsequent work by Toops and Riddick[3] has resulted in a very accurate freezing-point depression method which may be used to determine the content of gamma isomer. It is probable that a specification will be written around this test that will assure accurate control of lindane.

## CHLORDANE

A more complex problem is encountered in the case of chlordane. This chemical is made by com-

bining hexachlorocyclopentadiene and cyclopentadiene to form a Diels-Alder addition product of the formula $C_{10}H_6Cl_6$ (Fig. III), and then chlorinating the product in carbon tetrachloride solution. Chlordane is a viscous, amber-colored liquid, boiling at 175° C. at 2 mm. pressure. It does not crystallize, but may be separated into many crystalline compounds by chromatography Vogelback[4] prepared chlordane by a procedure described in English patents and succeeded in separating the following crystalline compounds by this technic:

| *Compound* | | *Melting point (°C.)* |
|---|---|---|
| | $C_{10}H_6Cl_6$ | 154 |
| *alpha* | $C_{10}H_5Cl_7$ | 143-4 |
| *beta* | $C_{10}H_5Cl_7$ | 86 |
| *gamma* | $C_{10}H_5Cl_7$ | 102 |
| alpha | $C_{10}H_6Cl_8$ | 105.5-106.5 |
| *beta* | $C_{10}H_6Cl_8$ | 102-3.5 |
| *gamma* | $C_{10}H_6Cl_8$ | 141-1.5 |
| | $C_{10}H_5Cl_9$ | 209-211 |

Complete biological data on these compounds have not been published, but enough is known about them to show that many are important in the pesticidal action of the final mixture. Attempts to judge the biological activity of chlordane by determination of total chlorine have not proved satisfactory, because various combinations of these components can give the same total chlorine content but do not have the same biological effectiveness. The problem of determining the composition of technical chlordane is further complicated by the fact that there are at least eight theoretically possible stereoisomers of ($C_{10}H_6Cl_8$) chlordane.

It is perhaps fortunate that the manufacture of chlordane is controlled by one company. This makes possible the marketing of a more uniform product by control of the reaction condition and by blending production batches. The lack of chemical or physical tests that can be correlated quantitatively with insecticidal results has led to the use of biological test methods to maintain uniform toxicity of this product to insects.

### TOXAPHENE

Toxaphene (Fig. IV) is in a similar position. It is made from *alpha*-pinene, a constituent of turpentine, by isomerization to camphene and then by chlorination until the product contains 67 to 69 percent chlorine. It is an amber waxy solid, which may be induced to crystallize from solvents. Very little has been published on its chemical composition. From the general nature of the chlorination reaction it is known to be a complex mixture of compounds. Toxaphene is also patented and manufactured by one company, so that uniformity rests in the production and blending operations and biological tests as indicated for chlodane.

### ALDRIN AND DIELDRIN

Aldrin and dieldrin are more recent additions to the group of chlorinated hydrocarbons. Aldrin is made by the condensation of hexachlorocyclopentadiene with bicyclo-(2,2,1)-hepta-2,6-diene. Dieldrin is made by the oxidation of aldrin with a per acid (Fig. V). Both are crystalline solids when pure. Aldrin melts at 104-104.5° C., and dielddrin melts at 175° C. Aldrin is sold in a solution containing not less than 57 percent of the pure compound, as determined colorimetrically by conversion into a red dye. Dieldrin is sold as a crystalline powder containing not less than 85 percent of the pure compound as determined by infrared spectroscopy. Little is known about the impurities in these products other than that they are chlorinated hydrocarbons and solvents normally present in the manufacturing processes.

### PARATHION

The basic reactions by which parathion is made and the structural formula are given in Fig. VI, and some of the impurities are shown in Fig. VII. Of the impurities indicated, *p*-nitrophenol is the most serious because of its phytotoxic properties. Technical parathion is sold largely on the basis of its parathion content as determined by a colorimetric method. The content of parathion in technical material varies upward from 60 percent. This is not a patented product, and there is no generally accepted standard of quality for technical material. Consequently each company sets its own standards, and the user must take this into account.

### ALLETHRIN

Allethrin is the last one of the new synthetics to which I wish to call attention. Starting with pyruvaldehyde and the alkali salts of *beta*-keto acids, the indicated reactions show how a series of 4-hydroxycyclopentenones may be made (Fig. VIII). R = $CH_2$-CH=$CH_2$ represents the side chain of allethrin. The synthesis of the chrysanthemum monocarboxylic acid portion of alle-

thrin is shown in Fig. IX. This acid is then esterified with the hydroxycyclopentenone in Fig. VIII to make allethrin (Fig. X).

Allethrin is a colorless, viscous liquid. Its effectiveness as an insecticide has been correlated with an analytical method based upon its catalytic hydrogenation.[5] Technical allethrin containing at least 75 percent of allethrin has been prepared commercially. The composition of the by-products has not yet been fully investigated.

In connection with the synthesis and manufacture of allethrin a crystalline *alpha-dl*-trans isomer has been isolated.[6] This compound has a melting point of 50.5-51° C. and holds great promise as serving as a reference standard not only for allethrin but also for substances of the pyrethrin or allethrin type.

## FORMULATIONS

I think I have shown you enough ways by which the quality of pesticidal chemicals is determined to illustrate the importance of chemical work on their constituents and on analytical methods. Surely more work along these lines is urgently needed.

The pesticidal chemical is only part of the story. It is necessary to formulate these chemicals in such a way as to gain maximum effectiveness. Formulation may consist in grinding the chemical to a small particle size with an inert diluent for application either as a dust or as a suspension in water. It may also consist in dissolving the chemical in a solvent for application as a spray either of the solution as such or suspended in water as an emulsion.

The use of the aeroplane, liquefied-gas aerosols, and mist blowers has led to a widespread search for suitable solvents. Where the pesticidal chemical is a liquid this has been no problem, but many of the chlorinated hydrocarbons have limited solubility in petroleum oil and all are practically insoluble in water.

The most important result of an extended search for suitable solvents has been the recognition of the marked usefulness of the alkylated naphthalenes as solvents. These solvents are obtained from either petroleum or coal-tar sources. Their boiling range is from about 350° to 700° F., the specific gravity from about 0.9-1.0, and the flash point 140° F. or above. These solvents do not dissolve so much of most pesticidal chemicals as do benzene and toluene, but they have an advantage of lower toxicity to humans, less danger from fire because of their higher flash point, and relatively low cost. Aromatic hydrocarbons boiling above this range are rich in tri- and tetracyclic compounds, which are not desirable because they contain phytotoxic and photosensitizing substances. The alkylated naphthalene solvents are being used to increase the solubility of many of the chlorinated hydrocarbons for (1) fuel oils in airplane sprays, (2) mist blower concentrates, (3) refined and unrefined kerosenes for residual sprays, (4) aerosols to prevent crystallization, and (5) solvents for the formulation of emulsifiable concentrates.

Emulsifiable concentrates, as you know, are oil solutions of pesticidal chemicals that contain an emulsifier so that emulsions are formed when the concentrates are stirred into water. The recent development of nonionic emulsifiers, which are effective in both hard and soft water, has increased the importance of this type of formulation. A wide variety of emulsifiers are now available, and it is usually possible to make very satisfactory emulsions with any water-insoluble solution of a pesticidal chemical. Unfortunately, one cannot predict in advance which emulsifier will be best for any given solution, but progress has been made along this line and it is now possible to narrow down the number of emulsifying agents that must be tested.[7] Mixtures of emulsifiers have often proved superior to a single emulsifier, and even small amounts of an ionic emulsifier added to the non-ionic have improved emulsification.

## IMPORTANCE OF SURFACE TO BE TREATED

Another important aspect of effective control of pests, particularly with residual sprays, is the type of surface to be treated. Far too little attention has been given to picking the right formulation for a given surface. The spraying of plant surfaces may give quite different results from the spraying of, say, glass surfaces. Different types of building surfaces may give entirely different results. Thus an oil solution of a pesticide may penetrate an unpainted wood surface and lose its effectiveness. On the other hand, this penetration may prolong the action by a process known as efflorescense, whereby the oil returns to the surface and evaporates, leaving a continually renewed surface of toxic material. If the solvent is tightly absorbed or the solvent is relatively nonvolatile, the effectiveness of the material is lost very rapidly.

A rather striking example of the effect of surface has recently been pointed out by Hadaway and Barlow[8] in connection with studies on the residual action of aldrin, lindane, dieldrin, and DDT on mud building blocks in Uganda. On a glass surface the order of increasing duration of a residual deposit was aldrin, lindane, dieldrin, and DDT. On the dried Uganda mud blocks crystalline deposits of 200 mg. per square foot disappeared rapidly from the surface owing

# THE CHEMISTRY OF SOME OF THE NEW PESTICIDES

*Figure I*

**DDT**

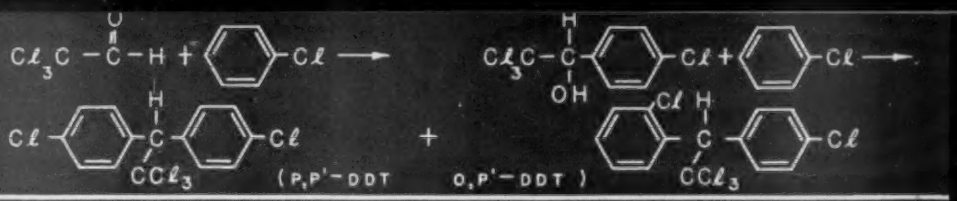



*Figure II*

**BENZENE HEXACHLORIDE**


*Figure III*

**CHLORDANE**

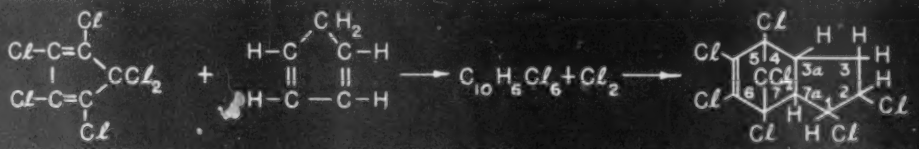



*Figure IV*

**TOXAPHENE**

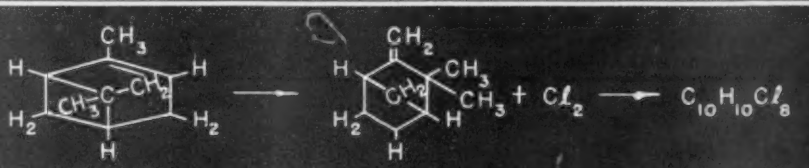



*Figure V*

**DIELDRIN**

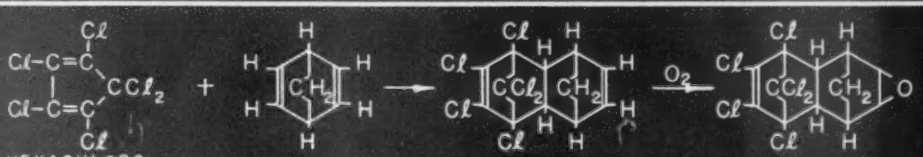



*Figure VI*

**PARATHION**

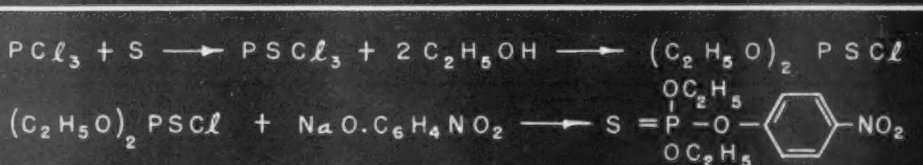



*Figure VII*

**ETHYL bIS (P-NITROPHENYL) THIOPHOSPHATE**

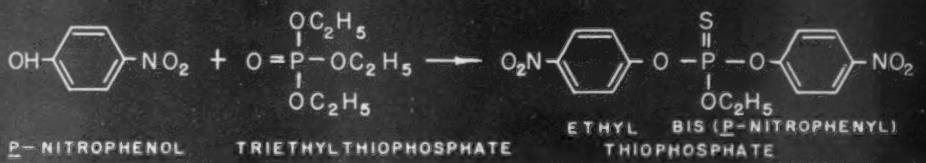



*Figure VIII*

**4-HYDROXY-CYCLOPENTENONE**

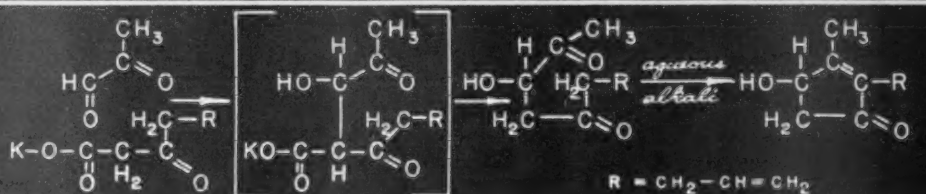



*Figure IX*

**CHRYSANTHEMUM MONOCARBOXYLIC ACID ETHYL ESTER**

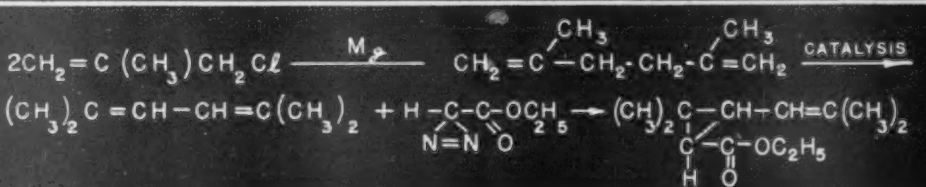
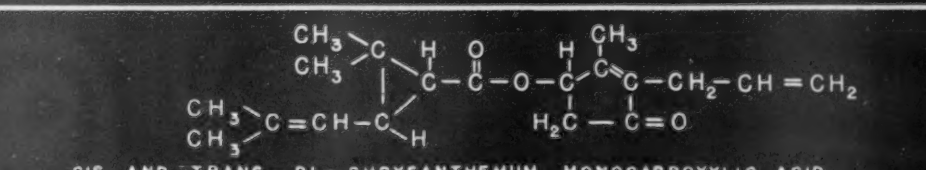



*Figure X*

**ALLETHRIN**




to sorption in the interior of the block. Surfaces treated with lindane or aldrin remained toxic much longer than those treated with DDT or dieldrin. This is surprising, as the vapor pressures of DDT and dieldrin are much lower than those of lindane and aldrin. The explanation lies in the fumigating action of the last two materials. The compounds of low vapor pressure were held tightly in the interior of the block, but those of higher vapor pressure were gradually liberated as toxic vapor through the surface. These examples show that much more study needs be given to the relationship of formulation to the surface to be treated. It seems probable that a great gain may be made in the overall effectiveness of a large spraying campaign if it is preceded by field tests to adjust formulations to the surfaces to be sprayed.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# 3 NEWER TOXICANTS OF ECONOMIC AND MEDICAL INTEREST

*by* FRANCIS F. HEYROTH

RECENTLY, THE NEWER ECONOMIC TOXICANTS have been shown capable of inducing characteristic alterations in certain tissues and it is now fairly generally recognized that several of them are capable of deleteriously affecting certain of the organs. The observation and interpretation of histopathological changes requires long training, and the application of these methods to the study of the changes induced in experimental animals is becoming a specialized field in pathology. Those of us who are primarily toxicologists rarely undertake such observations ourselves, but rely instead upon associated specialists in experimental pathology for conducting this phase of our investigative work.

## PATHOLOGY

In its broadest aspects, pathology means the study of disease, and may thus include all types of aberrations in function, including the biochemical. Customarily, however, it has come to be regarded as consisting predominantly in the study of the alterations of the bodily organs as exposed at necropsy or as observed microscopically in thin slices of tissues that have been suitably prepared and stained. Notwithstanding the fact that the preparation of the tissues by freezing or by immersion in formalin or other drastically acting chemical greatly distorts the natural features of cellular structure and of tissue architecture, a vast body of information has been amassed in regard to the superposed cellular and structural changes in tissues that characterize the operation of such causes of disease as infection, tumor growth, various toxic processes, and aging.

The utility of pathologic observations differs greatly in the study of acute and chronic poisoning. Microscopically detectable changes are only rarely produced instantaneously or even promptly following the ingestion of a toxic substance. Death occurs within a matter of minutes following the oral administration of a lethal dose of such highly toxic substances as nicotine or tetraethylpyrophosphate, and in such cases little can be learned by gross or microscopic examination of the tissues. Time has been lacking for the effects of these agents upon the tissues to become manifest, and death can be attributed only to an induced biochemical defect. Following the administration of suitable doses of certain other substances as DDT to experimental animals, or their accidental ingestion by man, life may continue for hours to days, thereby affording time for the appearance of more or less characteristic lesions. These are often overwhelming in extent and may differ in character from those that occur from the repetitive ingestion over long periods of the same poisons.. Indeed, some of the minor degrees of damage which result when


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Presented at the American Association for Advancement of Science, Subsection on Pharmacy Symposium on Pesticides, December 29, 1951, Philadelphia, Pa.

small amounts of an insecticide are incorporated in the diets fed to experimental animals over months or years may be even more characteristic. The changes in chronic intoxication are of importance in relation to the hazards of inhaling insecticidal mists, sprays, or dusts or of the entrance into the body of insecticidal solutions by passage through the skin of operators. Evidence as to the safety of the ingestion of insecticidal residues on foods is also provided by their study.

Time does not permit a complete review of the pathologic changes induced by the entire gamut of the newer insect repellents, herbicides, rodenticides, and insecticides.

## INSECT REPELLENTS

Prior to the war, but a few repellents were in widespread use, and these were of very limited efficacy, and posed no serious problems in toxicology. They included aromatic oils (cloves, citronella, cinnamon, lemon, peppermint, pennyroyal), camphor, and such synthetic compounds as terpinyl acetate, ethylene glycol, and esters of salicylic acid. Because of the dispersal of our troops in parts of the world abounding in insect carriers of malaria and other serious diseases, the Insect Control Committee of the Medical Division of the Office of Scientific Research and Development stimulated the synthesis of new and more effective repellents by university and commercial laboratories. A very great number of candidate compounds were tested entomologically, and 4,000 were tested for safely by the United States Public Health Service and the Food and Drug Administration.[1] Some 18 of these were regarded as safe for tropical military use, which may involve daily applications of so much as 0.25 ml. per Kg. of body weight. Pathological examinations were made on acutely poisoned animals following oral administration and on rabbits subjected to cutaneous applications repeated over a period of ninety days.

Among those of the approved repellents which have subsequently been introduced commercially are dimethyl phthalate, 2-ethyl hexanediol,1,3, (Rutgers 612), 2,4-dinitroanisole, (Indalone), and a scabicide, benzyl benzoate, as well as a number of others. Pathologic changes in the kidney have been encountered after the administration of large, toxic doses of dimethyl, 2-phenoxyethyl acetate, piperonyl cylo-hexanone, and a few others. Some of the repellents also affect the liver, and a few have given evidence suggestive of damage to the bone marrow. By and large, however, examinations of rabbits employed in the 90-day cutaneous tests of the approved repellents offered little or no evidence of harm to the tissues.

## HERBICIDES

Among the most widely used herbicides are 2,4-D,dichlorophenoxyacetic acid and its salts. Its toxicity was rather thoroughly investigated by Hill and Carlisle at Camp Deterick.[2] When given orally its $LD_{50}$ value expressed in mg. per Kg. of body weight, varies from species to species, being 375 for mice, 666 for rats, 800 for rabbits, and 1000 for guinea pigs. Poisoned animals exhibit among other less characteristic signs of illness a muscular rigidity that mimics a disease—myotonia congenita — that sometimes occurs spontaneously in goats and men.[3] Dogs given intravenously either 25 or 50 mg. per kg. on each of six successive days gave evidence suggestive of cumulative action. In some, bleeding gums and decubitus ulcers developed, and the blood of a few exhibited a sharp reduction in the number of lymphocytes and, less frequently, of polymorphonulcear leucocytes. On pathological examination, most species exhibited only tubular degeneration in the kidneys. Dogs differed in having centrolobular hepatic degeneration. As ordinarily used, 2,4-D is regarded as relatively safe.

Organic mercurial compounds find some use as herbicides or weed killers for lawns. Although inherently more toxic than 2,4-D, they can safely be used on ornamental lawns, if applied in the manner and quantities specified on the labels. In intoxication by these compounds the damage is chiefly to the excretory organs, the kidneys being most severely affected.

A number of urethane derivatives have been proposed for use as herbicides. As yet their toxicities have been less extensively investigated.

## RODENTICIDES

*Thallium* salts were among the first of the newer rodenticides to find use.[5] Introduced in Germany about 1920, they have been used for the eradication of rats, prairie dogs and ground squirrels by the Division of Predatory Animal and Rodent Control, U. S. Bureau of Biological Survey. Thallium is highly toxic, the lethal dose for rats being between 20 and 25 mg. per kg. The

ingestion by a rat of 0.2 mg. of thallium acetate per day can cause severe poisoning in several weeks. In California, 11 Mexicans were poisoned as a result of eating tortillas made from a stolen store of thallium-treated barley intended for use in eradicating ground squirrels. Three recovered, 6 died, and 2 remained psychotic. In another instance, 31 persons were exposed, 22 had symptoms and 6 died. Necropsies revealed hyperemia and punctate hemorrhages in the gastric and upper intestinal mucosa and a marked fatty infiltration of the cells of the liver, with a tendency to central necrosis. Degenerative changes were found also in the renal glomeruli and convoluted tubules. Profound changes were found in the central nervous system, there being various degrees of chromatolysis in the bodies of the nerve cells in various parts of the brain, and degenerative changes in the axones and myelin sheaths of the nerves. In chronically poisoned animals, other more varied changes have been reported, including alterations in the myocardium, bronchopneumonia, bony changes, corneal opacities, cataracts, intraocular hemorrhage, retrobulbar neuritis, partial atrophy of the optic nerve, and changes in the adrenals. A characteristic of thallium poisoning is a loss of hair. Some dermatologists have used it as a depilatory in the treatment of ringworm of the scalp of children, a procedure that in the past caused many cases of intoxication. Some years ago the indiscriminate sale of a depilatory cream containing 7 per cent of thallium led to the occurrence of over 50 cases of poisoning.

*Sodium fluoroacetate.* During the war, Compound 1080, or sodium fluoroacetate, was found to be a highly effective rodenticide. It is an extremely toxic compound, the LD being only 2 or 3 mg. per kg. Death occurs within 6 to 15 hours, only a few poisoned animals living so long as three or four days. The cause of death varies in different species. According to Chenoweth and Gilman,[6] the heart is primarily affected in rabbits, goats, horses, and spider monkeys, death occurring from ventricular fibrillation. Dogs and guinea pigs, however, exhibit epileptiform convulsions, death occurring from cessation of respiration without cardiac abnormality. Rats, which respond as an atypical species, develop an extremely slow pulse rate.

The pathologic response to 1080 is primarily a biochemical one, an interference with one of the sequence of reactions that characterize carbohydrate metabolism. The pathologic tissue changes detectable on microscopic examination are consequences of this interference with cellular metabolism. They include degeneration and necrosis of the myocardial fibers, hepatic cells, and renal tubules. Injury to the brain may be severe, with widespread vascular congestion, cerebral edema, and chromatolysis of the neurones.

*ANTU.* The discovery of the rodenticide ANTU came about in a curious fashion. In the course of studies on the inheritance of the ability of men to taste certain compounds, Curt Richter, a psychologist at Johns Hopkins, had the occasion to administer phenylthiourea to rats.[7] It proved to be unexpectedly toxic, which suggested its possible use as a rodenticide. Since, however, rats refused baits containing it, Richter investigated about a hundred related compounds and found *alpha*-naphthylthiourea the most effective as a rodenticide. It was applied systematically over a large part of the city of Baltimore over a period of two years at a cost of $50,000 per year. No human poisoning occurred in these tests, but a few dogs died. The toxicity varies widely with the species, only Norway rats, mice, and dogs being killed by dosages of less than 100 mg. per kg. Even among rats, susceptibility varies widely with strain, age, and diet.

Large effusions appear in the pleural cavities of poisoned rats and cats, and the cause of death is usually hemorrhagic pulmonary edema. The effusions are rare in rabbits. Fatty degenerative changes may also be found in the liver. Although its chronic toxicity has been less extensively studied, ANTU belongs to the class of thioureas and therefore has the ability to interfere with the normal synthetic activity of the thyroid gland.

*Warfarin.* A more recently introduced rodenticide is Warfarin, a coumarin derivative which acts to interfere with the normal processes of blood coagulation. Its use is believed to be relatively safe. The name is derived from the initials of the Wisconsin Alumni Research Foundation, under whose auspices it was developed.

## INSECTICIDES

Toxicologic study of the newer insecticides has centered largely upon the organic phosphates and the chlorinated hydrocarbons, although the

organic thiocyanates, as the lethanes and thanites, have also been given attention.

Among the organic phosphates are tetraethylpyrophosphate and Parathion, as well as a number of others. These are extraordinarily toxic compounds that have caused a number of fatalities among formulators and pest control operators. Some of the compounds of this class suffer ready hydrolytic decomposition and, therefore, are not believed to offer a serious food residue hazard. In large part, they act by a biochemical mechanism, inhibiting the activity of cholinesterase, an enzyme concerned in neuromuscular activity. Such changes in the tissues as may be observed microscopically—enterocolitis and necrosis of the gall-bladder—result primarily from the effects of the anticholinesterase activity. After death, the extent of the diminution of this activity in the blood, brain or muscles may be measured by manometric methods. Bergner and Durlacher have recently described[8] a microscopic method for detecting areas in which the activities of this enzyme have been disturbed.

Pathologic studies of the effects induced by lethane have revealed more or less generalized organ damage, but little that is characteristic.

*DDT.* The chlorinated hydrocarbon insecticides have been and are being very thoroughly studied. The advent of DDT during the war, and its demonstrated insecticidal effectiveness, led to concerted toxicologic studies in order to learn how it might safely be used in protecting military and civilian populations against epidemics of insect-borne diseases. Because of the then immediate need, the war time efforts were devoted primarily to observations of its acute or subacute toxicity. It soon became evident that animals fatally poisoned by the giving of a single large dose exhibited generalized congestion of the brain, lungs, and abdominal viscera, cloudy swelling of the myocardium, and acute toxic changes in the liver and kidneys, the liver being by far the most seriously affected.[9] Large centrolobular and midzonal areas exhibited coagulation necrosis, the cells being partly or completely detached from the normal parenchyma, while the regional sinusoids contained cullular fragments and precipitated albuminous fluid. Kidney changes were limited to the proximal convoluted tubules where the cytoplasm was pale, coarsely granular and frequently marked by many fine, foamy vacuoles. The glomeruli and vessels were unchanged. Less frequently observed lesions include patchy myocardial degenerative changes, focal necrosis of the gall-bladder, subendocardial hemorrhages, colloid depletion of the thyroid, testicular atrophy, and occasional degenerative changes in the muscles. Attempts to detect alterations in the central nervous system that might serve to explain the well-known nervous manifestations of immediate intoxication have met with disappointment, significant changes not being encountered in the cerebrum or brain stem. Occasional degenerative changes have been detected in a few cells in the spinal cord.

When the agricultural uses of DDT began to assume importance a more thorough study of chronic intoxication had to be undertaken because of its importance for an understanding of the hazards of ingesting over long periods such DDT residues as may occur on food. The feeding of DDT at various levels in the diets of rats made clear the occurrence of three phenomena that are less readily demonstrable in experiments of briefer duration, viz., (A) an increase in the weight of the liver in relation to the body weight, (B) the presence of characteristic alterations in the hepatic cells of rodents fed at very low dietary levels and (C) the storage of DDT in the organs and, particularly, in the fat:

(a) In an experiment of Sarett and Jandor,[10] the presence of DDT in the diet to the extent of 700 p.p.m. was associated with a 40 percent increase in the weights of the livers of rats over those of rats given a control diet, while Fitzhugh and Nelson[11] found detectable enlargement in the livers of rats given 400 p.p.m.. In our investigations, one of three rats given 150 p.p.m. over two years had an unusually large liver, but no significant increase in size was found in those given 75 p.p.m.

(b) In the livers of rats fed diets with fairly large amounts of DDT, Nelson described, in addition to the previously mentioned necrotic changes, hypertrophy and increased cytoplasmic oxyphilia of the centrolobular hepatic cells, with increased basophilia and margination of the cytoplasmic granules and a tendency toward hyalinization of the remainder of the cytoplasm. This change, which is reversible, appears in purer form in the livers of some of the rats fed at very much lower dietary levels, the proportion of the livers in various groups of rats affected decreasing with the dietary level at which they were fed DDT. Minimal evidence for the occurrence of this type of change has more recently been found by Nelson[12] in the livers of rats fed for 4 to 6 months on diets with only 5 p.p.m. Indeed, in our laboratory, cells of this appearance have been found in the livers of some rats given only a DDT-free diet. These peculiar hepatic cellular changes have not been described in the livers of dogs fed over long periods.

(c) Storage of DDT in the fat has been demonstrated to occur at practically all dietary levels. Stored DDT disappears slowly from the fat after the feeding of DDT has been discontinued.

It has been stated by Haymaker, Ginzler and Ferguson[13] that moderate to severe degenerative changes were found in certain cells of the cerebellum of dogs fed daily over long periods large doses of DDT of the order of 150 to 350 mg. per kg. of body weight. On the other hand, Globus,[14]

an experienced neuropathologist, found no changes in the brains or cerebellar hemispheres of chronically poisoned dogs, rats, cats, or monkeys, with the possible exception of some reduction in the staining quality of the tigroid substance in an occasional field in slides from the cerebral cortex of cats.

*Other Chlorinated Hydrocarbons.* In general, the other insecticides of the chlorinated hydrocarbon type, including toxaphene, benzene hexachloride and its stereoisomeric components, chlordane, aldrin, and dieldrin, give rise to somewhat similar pathological changes, but differ among themselves and from DDT with respect to the frequency and severity with which they induce them when fed at comparable dietary levels. In acute poisoning by chlordane, we have found that vascular damage characterized by congestion, arteriolaritis, capillary venous stasis and thromboses of arterioles and venules, occurs in all of the viscera and is particularly striking in the lungs. In chronic poisoning, the cardiovascular and pulmonary changes are less evident, the damage being predominantly to the liver and kidneys and, to a lesser extent, the brain. In the limited time available it is not possible to present a detailed comparison of the relative effectiveness of the various members of the class of chlorinated hydrocarbon insecticides in respect to the hepatic enlargement, the frequency of specific hepatic cellular changes, and the ease and persistence of storage.

The practical significance in relation to human poisoning of the changes encountered in experimental animals requires brief comment. The deviations from normal in the hepatic cells of rodents are encountered at dietary levels far below those which afford any other evidence of harm. They may be objective manifestations of processes by which the toxic agents are attacked metabolically. They do not seem to occur with any regularity in the livers of dogs, although dogs are, in general, more susceptible than rats to poisoning by the chlorinated hydrocarbons. Whether they occur in the hepatic cells of man is not known.

The significance for man of the hepatic changes in rodents and of storage cannot be learned solely by animal experimentation. It can only be evaluated by engaging the interests and collaboration of pathologists associated with hospitals in agricultural regions in collecting in the course of routine necropsies suitable samples of abdominal fat and visceral organs for the determination of the amounts of stored insecticide. If this were done, correlation of the analytical data with satisfactory medical and pathological records would serve to bring to light any relationships that may exist. The findings on healthy young persons who died following accidental injuries would be of particular value, for in these cases it should not be too difficult to learn whether in man the presence of large amounts of these pesticides in the fat is associated with the occurrence of characteristic histologic alterations in the hepatic cells.

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THE following article, including *Job Descriptions for Chief Pharmacist* (*Pharmacist*) *and Pharmacy Helper,* is part of a book outlining job descriptions for all hospital personnel. Prepared by the United States Employment Service in cooperation with the American Hospital Association, it is primarily for the use of public employment offices and as a source of occupational information for hospital personnel administrators.

The sections on the Chief Pharmacist (Pharmacist) and Pharmacy Helper were worked out in cooperation with the Division of Hospital Pharmacy of the American Pharmaceutical Association and the American Society of Hospital Pharmacists. It should be noted that in presenting the information, it has been necessary to follow the style as set up by the Employment Service and the job descriptions are *general.* As noted in the book:

Reprinted from *Job Descriptions and Organizational Analysis for Hospitals and Related Health Services,* 1952. Published by United States Employment Service in cooperation with the American Hospital Association. Copies of bound volume covering job descriptions for all hospital personnel are available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.


*Each job description has been compiled from a number of different sources and therefore describes the occupation in a generalized, composite form. Consequently, no description can be expected to coincide exactly with any specific job in a particular establishment or in a particular locality. To be of greatest usefulness, the descriptions should be supplemented by local information concerning the specific jobs in the community.*

## the pharmacy department

*Purpose*: Supply all prescriptions and manufactured stock drugs and solutions to both inpatient and outpatient services.

*Responsibility for*: Routine preparation and sterilization of injectible medication and compounding of prescriptions. The Pharmacy dispenses drugs, chemicals, pharmaceuticals, and narcotics on orders of a physician. It is responsible for filling and labeling all drug containers in compliance with specifications; purchase and storage of drugs, chemicals, and pharmaceutical preparations; and periodic inspection of pharmaceutical supplies in nursing units. An approved stock of antidotes is maintained. Records are kept relative to prescriptions filled, and alcohol, narcotics, and poisons dispensed. Purchase of supplies and equipment is performed either directly or through the hospital purchasing agent. In either case, the Pharmacy Department retains responsibility for establishing specifications of material to be purchased.

*Authority*: The Pharmacy is under the direction of a licensed chief pharmacist, who reports to the assistant administrator. A pharmacy committee consisting of the chief pharmacist and members of the medical departments should meet periodically to determine pharmacy policy and supervise purchase and issuance of drugs, chemicals, pharmaceutical preparations, biologicals, and professional supplies. The chief pharmacist is delegated authority for carrying out the functions of this department.

*Inter- and Intra-Relationships*: The pharmacy maintains operating relationships with most of the medical, technical, and administrative personnel of the hospital. Relationships are maintained on a day to day basis with medical staff. This involves advising the medical staff as to use and modes of administration of various drugs. Close working relationships are also necessary among the Pharmacy, Nursing, and Purchasing Departments. Each have functions which are closely allied. Meetings to discuss common problems and activities result in more effective programs.

*Standards*: Standards for the Pharmacy Department are recommended by the Committee on Pharmacy of the American Hospital Association and the American Pharmaceutical Association. These standards include recommendations regarding housing, personnel, pharmacy committee, maintenance of pharmaceutical reference library, and use of approved drugs and pharmaceuticals. Legally, all pharmacies must retain a record of physicians' orders for drugs. Only drugs, chemicals, and pharmaceutical preparations of at least the quality indicated in *United States Pharmacopeia, National Formulary,* and *New and Nonofficial Remedies* should be used in treatment of patients.

*Physical Facilities and Staffing*: The Pharmacy that serves only inpatients may be placed in any location convenient to hospital personnel. Ample shelf space is required for bulk packages. A dispensing window and suitable storage cabinets are also necessary. If the Pharmacy serves outpatients as well as inpatients, it should be located so as to be easily accessible to both.

Laws in most states require that only a licensed pharmacist may compound prescriptions. He may be employed on a full-time or part-time basis as required by the needs of the hospital. If the volume of work is insufficient to warrant employment of a pharmacist, arrangements can be made with a convenient commercial pharmacy to dispense all prescriptions. The hospital should, however, maintain a drug room from which prepared drugs

are issued. Wherever necessary, as many additional pharmacists and helpers are added to the staff as are needed to insure adequate pharmacy service.

## *chief pharmacist* (OR PHARMACIST)

### JOB SUMMARY

Compounds and dispenses medicines and preparations according to prescriptions written by physicians, dentists, and other practitioners authorized by law to prescribe: Prepares and sterilizes injectible medication manufactured in hospital, and manufactures pharmaceuticals. Furnishes information concerning medications to physicians, interns, and nurses. Plans, organizes, and directs pharmacy policies and procedures in accordance with established policies of hospital. Implements decisions of Pharmacy and Therapeutics Committee of which he is a member. Performs related duties.

### PERFORMANCE REQUIREMENTS

*Responsibility for*: Preparation and sterilization of injectible medication manufactured in hospital; manufacture of pharmaceuticals; dispensing of drugs, chemicals, and pharmaceutical preparations; filling and labeling of all drug containers issued to services; inspection of all pharmaceutical supplies on all services; maintenance of an approved stock of antidotes and other emergency drugs; dispensing of all narcotic drugs and alcohol and maintenance of a perpetual inventory of them; specifications for purchase of all drugs, chemicals, antibiotics, biologicals, and pharmaceutical preparations used in treatment of patients; furnishing information concerning medications to physicians, interns, and nurses; establishment and maintenance, in cooperation with accounting department, of a system of records and bookkeeping in accordance with policies of hospital for charges to patients, and control over requisitioning and dispensing of drugs and pharmaceutical supplies; planning, organizing, and directing pharmacy policies and procedures in accordance with established policies of hospital; cooperation in teaching courses to students in school of nursing and in medical intern training program; implementing decisions of Pharmacy and Therapeutics Committee; and preparation of periodic reports on progress of department.

Accuracy in use of chemical and pharmaceutical equipment for compounding and dispensing drugs and medicines. Follows prescriptions in detail, and is accurate in labeling of containers and indicating directions for use.

*The preparation and publication of this volume has been achieved through the cooperative efforts of the United States Employment Service and the American Hospital Association. It is designed to provide occupational data for personnel of the various State Employment Services and for hospital administrators as an aid in the solution of a variety of personnel problems in institutions concerned with care of the sick and injured.*

*The need for occupational information is predicated on a desire to develop to the fullest, the potentialities of those human resources which are available to a particular organization . . .*

*There are almost 1 million persons employed in the hospital industry on a full-time basis. Proper utilization of their skills is essential both to the quality of services rendered by hospitals and to the morale and efficiency of the employees . . .*

MAURICE J. TOBIN
*Secretary of Labor*

*Physical Demands*: Stands most of working day. Handles and manipulates chemicals and chemical equipment, necessitating considerable finger dexterity and eye-hand coordination. Walks, stoops, reaches for, lifts, and carries relatively light articles.

*Special Demands*: Willingness to work with realization that errors may have serious consequences to patient. Sustained attention to details over extended periods of time. Memory for details. Alertness to detect errors in prescription, dosages, and compounding. Cooperation with other employees and ability to supervise subordinate workers. Considerable initiative and judgment involved in solving pharmaceutical, chemical, and pharmacological problems; requisitioning supplies; and furnishing information concerning medications to physicians, interns and nurses; and planning operation and work schedule of department. Works under nominal supervision. Follows standard formulas, but makes frequent independent decisions in a variety of technical and administrative matters.

### QUALIFICATIONS

*Education*: Completion of a four-year course at an accredited school of pharmacy leading to a degree of bachelor of science in pharmacy. The accepted pharmacy curriculum includes at least 3,488 clock hours of instruction.

*Training and Experience*: Licensure is required by law for practice of pharmacy, and is granted by state or territory in which pharmacist functions. Requirements set by state usually include:

1. At least 21 years of age.
2. Forty-seven states and the District of Columbia require graduation from a college of pharmacy. In one state it is possible to enter profession with practical experience alone.
3. Of states requiring college graduation, all but three require from one to two years of practical experience as well.
4. Registration in state of practice is through a board of pharmacy examination, or by a reciprocity agreement based on such an examination.
5. A hospital pharmacy internship is desirable.

*Job Knowledge*: Must be familiar with professional and commercial phases of pharmacy, and be able to fill prescriptions. Must understand what drugs should be purchased and which are more economically manufactured in hospital. Understands and can use the *United States Pharmacopeia, National Formulary, New and Nonofficial Remedies*, and textbooks related to field of pharmacy. Has working knowledge of public health matters and first aid. Is familiar with Federal and state laws regulating profession. Knows uses and dosages of medicines. Is familiar with drug incompatibilities. Understands pharmaceutical and chemical procedures and technics, and weighs and measures in all systems. Understands role of Pharmacy Department in hospital. its interrelationships with other departments, and functions of a department head. Is able to apply principles of personnel management to selection of workers.

**EMPLOYMENT VARIABLES**

*Professional Affiliations*:

American Pharmaceutical Association
American Society of Hospital Pharmacists
State and local pharmaceutical associations

*Other Work Phases Frequently Performed:*

Purchase of department supplies and equipment
Supervision of central supply

**WORKING ENVIRONMENT**

Works in clean, well-lighted, and heated area. Pharmacy area may be crowded and poorly ventilated. Is subject to various chemical odors, and burns and skin irritations from chemicals. Some danger of cuts from glassware, and burns from alcohol lamps or bunsen burners.

**JOB RELATIONSHIPS**

*Source of Workers*:

Chemist, Pharmaceutical
Pharmacist Apprentice
Pharmaceutical-Laboratory Assistant
Prescription Clerk

*Promotion from*: No formal line of promotion.

*Promotion to*: No formal line of promotion. Promotion may be through addition of increased administrative or supervisory responsibilities.

*Supervised by*: Assistant Administrator for administrative purposes, and Assistant Administrator, Medical for professional practice.

*Workers Supervised*: Other pharmacists; pharmacy helper; laboratory technicians or helpers; pharmacy interns; aides.

*Interrelationship*: Some elements of work may be performed by emergency room nurse or medical staff.

**WORK PERFORMED**

Compounds and dispenses dosage forms of drugs and medicines: Receives prescriptions written by physician, dentist, or other practitioners authorized by law to prescribe for antibiotics, biologicals, emulsions, liquids, powders, tablets, capsules, ointments, and other pharmaceuticals, and reviews them to determine possibility that overdoses have not been prescribed, or that toxic compounds may be formed. Interprets prescription, selects ingredients, determines pharmaceutical, chemical, physical, or physiological incompatibilities; and sets up required laboratory equipment in accordance with established standards and procedures. Fills prescriptions and manufactures pharmaceutical preparations by means of standard physical and chemical procedures, such as filtering, distilling, emulsification, trituration, and other. Prepares and sterilizes all injectible medication manufactured in hospital, and compounds and sterilizers other pharmaceuticals as required. Bottles or otherwise packages prepared compounds. Types instructions on labels for identification and use of medication, and affixes label to container. Dispenses and sells prescriptions and sick room supplies to physicians, employees, and public. Forwards record of charges to business office for posting to patients' accounts. Forwards prescriptions and other preparations to various hospital departments as requested.

Makes routine assays and tests of various drugs and chemicals to determine their purity, identity, and strength: Weighs out prescribed amounts of drugs and chemicals, using balance and graduate, and performs sequence of pharmaceutical and chemical operations in accordance with standard procedures. Stores and preserves biologicals, vaccines, serums, and other drugs subject to deterioration dates. Rotates stock to insure that drugs and medicines will not lose their potency, and to eliminate waste. Places certain drugs in special containers to prevent deterioration caused by light, air, or heat.

May perform research in field of pharmacy: May perform research in manufacture and development of medicinal preparations, and compound new pharmaceutical preparations, based on research in professional journals and a knowledge of chemical reactions, and physical and pharmacological properties of chemicals. Performs research to improve stability and palatability of drugs.

Maintains stock of supplies: Maintains an approved stock of antidotes and other emergency drugs. Inventories pharmacy stock periodically and requisitions material in anticipation of need. Provides purchasing office with specifications for all material to be ordered. Approves bills for payment of pharmacy supplies. Approves requisitions required prior to issue of pharmaceutical supplies on nursing units. Maintains formularies and sources of information on widely used preparations not included in *United States Pharmacopoeia, National Formulary,* and other compendia. Maintains reference texts and journals in department.

*Performs related duties:* With approval and cooperation of Administrator, initiates, develops and carries out rules and regulations pertaining to administrative policies of department. With approval and cooperation of the Pharmacy and Therapeutics Committee, initiates, develops and carries out rules and regulations pertaining to professional policies of department, subject to final approval by Administrator. Establishes and maintains, in cooperation with the Accounting Department, a system of records and bookkeeping in accordance with policies of hospital for (1) charging patients for drugs and pharmaceutical supplies, (2) maintaining adequate control over requisitioning and dispensing of all drugs nad pharmaceutical supplies. Maintains a control file of narcotics, poisons, and habit-forming drugs received and issued in accordance with Federal and State regulations. Maintains prescription files. Consults with and advises members of medical and related staffs concerning information on medications, including incompatibility of drugs, warnings, and contraindications.

## pharmacy helper

**JOB SUMMARY**

Performs routine duties in Pharmacy: Receives, unpacks, and stores supplies, checking shipment against invoices. Delivers drug orders and runs errands. Washes bottles and glassware. Files requisitions. Maintains working area in clean and orderly condition. Under direct supervision of Chief Pharmacist, assists in preparation of various pharmaceutical preparations and in labeling of bottles. Maintains card file record of purchases. Performs related routine tasks.

**PERFORMANCE REQUIREMENTS**

*Responsibility for*: Cleanliness of working area. Accuracy in performing assigned duties. Providing assistance as required.

*Physical Demands*: Stands and walks most of working day. Lifts and carries cartons and drug orders which may be fairly heavy. Stoops, bends, pushes, and pulls when cleaning area. Handles and manipulates chemical equipment and glassware.

*Special Demands*: Willingness to perform routine, repetitive tasks on a continuous basis. Cooperation with others, and ability to take orders readily and follow directions precisely. Some initiative involved in providing assistance as required. Works under close supervision performing tasks which no previous training or experience is required. Employees receive explicit instructions and supervision while tasks are new. Supervision lessens as worker gains experience.

**QUALIFICATIONS**

*Education*: High-school graduation including courses in chemistry and general science is preferable.

*Training and Experience*: This is an entry job. Previous experience desirable, but not essential.

*Job Knowledge*: Must know how to perform simple chemical operations, use scales and balances, and be able to clean chemical glassware.

**EMPLOYMENT VARIABLES**

Work Phases May Perform:
- Record keeping
- Selling
- Typing

**WORKING ENVIRONMENT**

Works in clean, well-lighted, and heated area. Pharmacy area may be crowded and poorly ventilated. Is subject to various chemical odors, and burns and skin irritations from chemicals. Some danger of cuts from glassware, and burns from alcohol lamps or bunsen burners.

**JOB RELATIONSHIPS**

*Source of Workers*:
- Labor, Stores
- High-School graduates with courses in chemistry

*Promotion from*: This is an entry job.

*Promotion to*: No formal line of promotion.

*Supervised by*: Chief Pharmacist.

*Workers Supervised*: None.

*Interrelationship*: Tasks involving handling of stock are similar to those performed by Stores Clerk.

Work Performed
- See Job Summary.

*'harmacy showing stock solution storage in manufacturing rea and a view of prescription space.*

# A MODERN PHARMACY

## FOR A SMALL HOSPITAL

*by* MRS. MARY E. MORGAN

Children's Hospital, Akron, Ohio, is devoted entirely to the care of children. Ages range from birth to 15 years. It is a non-profit hospital, with a 150 bed capacity.

As it is a specialized hospital, our problems and operations are somewhat different than the average adult hospital. All equipment, rooms, decorations and procedures are scaled to meet the needs of children. In this the pharmacy must fall in line. As doses of medicine for children are much smaller, we perhaps use about one-half the quantity of drugs normally used in a 150 bed adult hospital. More liquid preparations are used than tablets, and we have often worked out formulas for liquid sulfa preparations, cough syrups, nose drops and various preparations suitable for children. However, I believe children generally take medicine without questioning it, being used to parental direction at home. We have found in our experience that it is adults who grumble at the taste of medicine and large tablets.

Capsule and tablet preparations, such as Aureomycin, etc., are taken out of the capsule, or the tablet is crushed, and administered in orange juice or suitable preparation. It is given with spoon or medicine glass. This saves the pharmacy time in preparation of a suitable liquid and is just as effective administration.

All drugs, except floor stocks, are dispensed either on requisition or prescription direct to patient, being then charged direct to his account from the pharmacy at time of dispensing.

MRS. MARY E. MORGAN is chief pharmacist at the Children's Hospital, Akron, Ohio.

*A basement location*
*does not detract*
*from the*
*convenience and service*
*offered by*
*this pharmacy department*

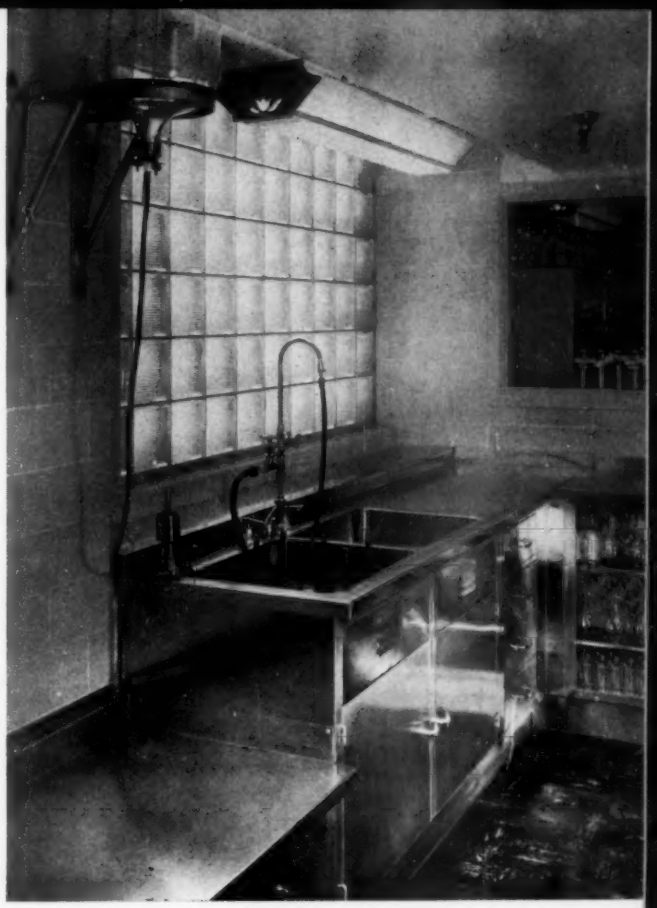
**FLOOR SPACE - LOCATION - STAFF**

The pharmacy is entirely new and is located on the basement floor in the new wing of the hospital. The over-all floor space is approximately 42 x 20 feet, and consists of a pharmacy office, one large room divided into manufacturing and prescription areas, a solution room, a storeroom, an alcohol storage room and an entrance foyer. We have occupied this new location approximately one year.

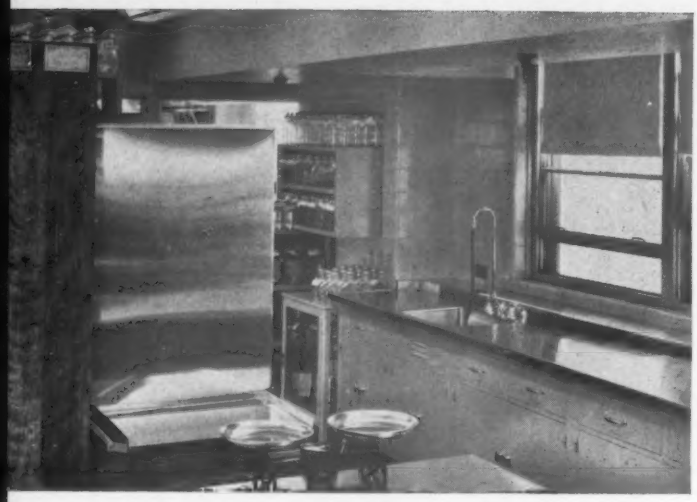
The staff consists of a chief pharmacist, who does only the administrative work in the pharmacy and the purchasing for the hospital, a staff pharmacist and two helpers.

Due to the fact that the pharmacy is located on the basement floor and in order to overcome a waste of nurses' and aides' time traveling from each division to the pharmacy, a pick-up and delivery system was devised by the pharmacy. All order baskets are picked up, filled and returned to the floors each morning. The pharmacy helper picks up new orders every hour and delivers orders picked up the previous hour. Hospital personnel come to the pharmacy for emergency orders only. This not only saves nursing time, but also the pharmacist's time. As all pharmacies cannot be located on the ground floor in a prominent position, this is a means of overcoming the problem of a basement location.

The manufacturing area is adjacent to the prescription area, the typewriter being located between, thus allowing each area to use it with a minimum of walking. The manufacturing area is designed with a center work table, a stone sink on the other side of the work table. Beside the stock bottle shelves is a rack containing three gallon carboys of stock solutions. The bottles are filled at this area and quickly placed on the stock shelves. We use the three gallon size because only women are employed in the pharmacy.



*Solution Room showing Flask washing and clean-up area. Solution storage can be seen on other side of glass wall.*



*A view of Prescription Area showing Schwartz Cabinet, refrigerator, work counter and sink*

The adjacent prescription area contains two sections of Schwartz cabinets, one of the Schwartz cabinets shutting off the view into the pharmacy and the entrance foyer. A pass window with stainless steel bars is at the end of this cabinet. Facing this window is another Schwartz cabinet shutting off the view into the pharmacy and back to back with this unit is a 30 cubic foot stainless steel refrigerator. A stainless steel sink is in the area. This enables the pharmacist to work quickly with all equipment, such as sink, ice box and drugs, with a minimum of steps.

The solution room contains all stainless steel cabinets, tile walls, glass block window and a ventilating system. A glass block window is used so dust cannot enter the room from window cracks.

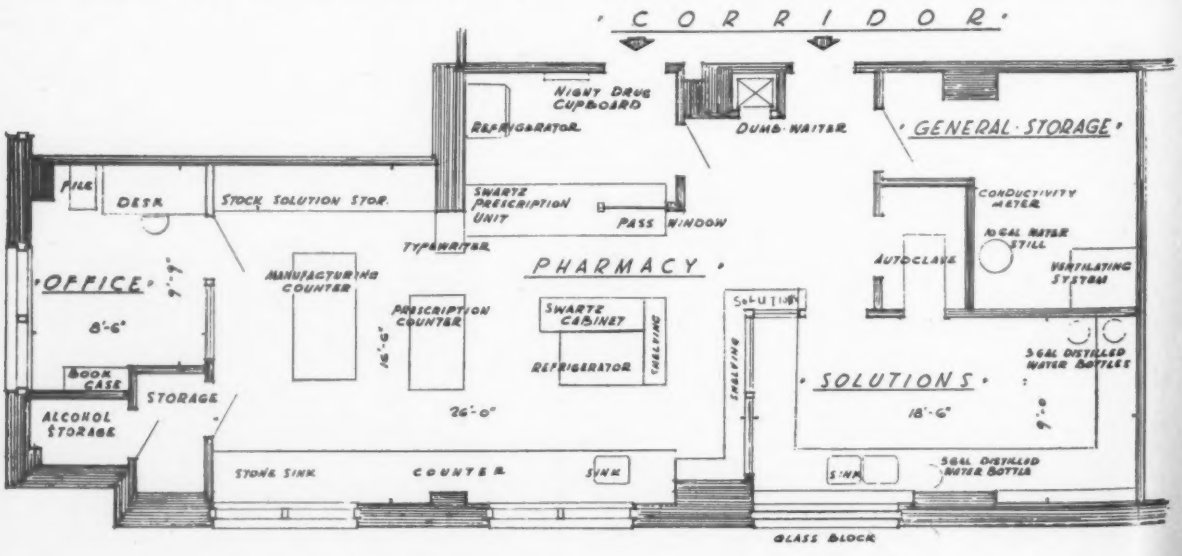
Glass walls are used between the solution room and between the office and main pharmacy area. This makes it possible when only one pharmacist is on duty for her to view the work of the helpers at all times. It gives an impression of size to small rooms, besides being more clean and giving more light to all areas.

Color plays a big part in our pharmacy. The tiled walls in all areas are yellow, the tables and cabinets are soft green enameled metal with stainless steel tops. The floor in the main work area is red asphalt tile, the office gray and the solution room green. It is surprising how much color adds to the appearance and cheerfulness of the whole area. It is just as easy to keep clean as an all white pharmacy, which was once thought essential.

## PREPARATION OF SOLUTIONS

In a children's hospital we have always been faced with the problem of using small, rather than quantities of sterile solutions. By making our own we can prepare it in the desired sizes. All intravenous solutions are made in 75 cc., 300 cc. and 500 cc., flasks only. All compress sterile solutions and those for other than intravenous use are made in 1000 cc. flasks. We also make 2000 cc. flasks of distilled water for surgery as there is no still in the Surgery Department. Fenwal bottles are used throughout. The system of making the solutions is as follows: Solution is made in a 17 liter bottle, being then filtered by vacuum through a frittered 90 cc. glass conical filter directly into the flask. This method is very satisfactory as it is a closed system for filtering solution from a 17 liter bottle into flask and is relatively inexpensive and a minimum of apparatus is required. This system would be adaptable to a hospital up to 500 beds.

A Leeds-Northrop conductivity meter is placed in the distilled water line and is attached to a bell system which sounds if the distilled water goes



below the amount of ohms at which the conductivity meter is set. This enables us to have a check on distilled water at all times. A recessed rectangular autoclave 24" x 24" x 48" is in the solution room.

The solutions are dispensed from central supply which is adjacent to the pharmacy. We have found the preparation of solutions to be a savings in money as well as a great convenience in that we have them in the correct volumes necessary for children.

## OUTPATIENT PRESCRIPTIONS

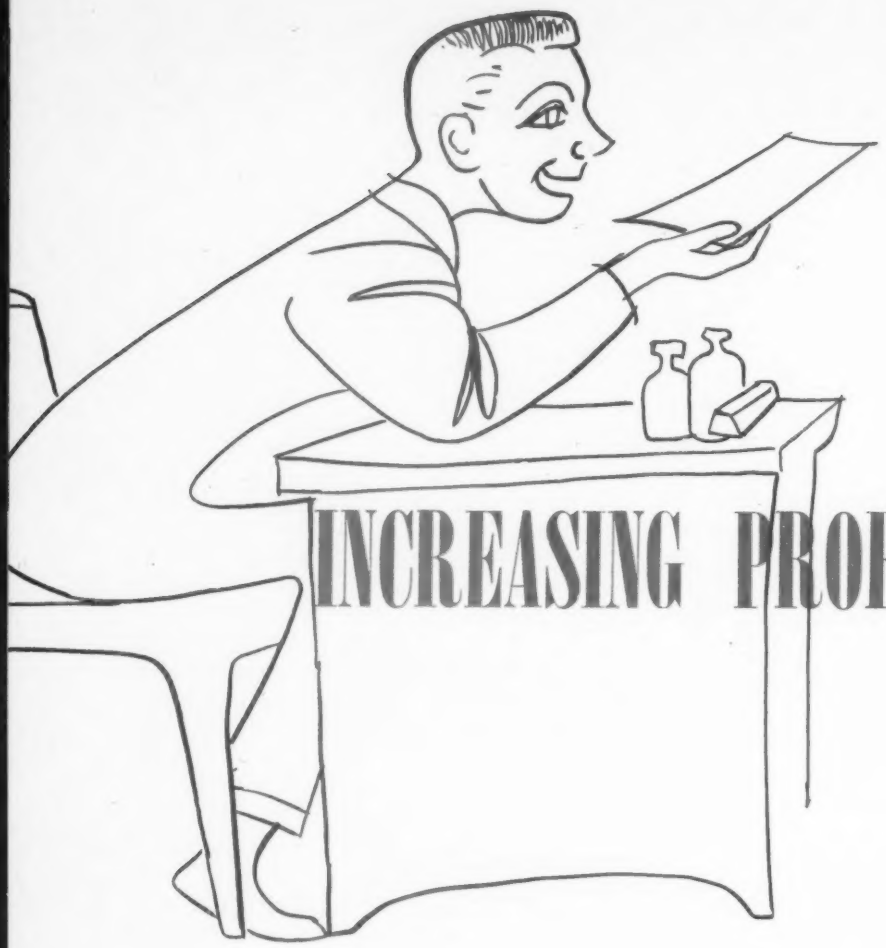
Outpatient prescriptions are handled by a dumb waiter system which runs directly from the pharmacy to the cashier's office, immediately above the pharmacy, which is in turn adjacent to the outpatient waiting room. The outpatient department sends the prescriptions to the pharmacy on the dumb waiter. They are filled and returned in this manner to the people waiting in the outpatient waiting room. This solves the problem of outpatients coming to the pharmacy. It also eliminates a pharmacy waiting room.

An entrance foyer of the pharmacy is off the main corridor, enabling those coming to the pharmacy to step in out of hall traffic. The foyer also serves as a night service area for drugs which might be called for after pharmacy hours. It contains a necessary supply of drugs and a nine cubic foot refrigerator to hold biologicals required after hours. These are dispensed by the night supervisor on requisition as needed.

Included in the new equipment added to the pharmacy is a five quart Hobart mixer and a Waring blender. We especially like the Waring blender as many of our preparations are made in small quantities. The mixing takes only a matter of seconds and is a great time saver. We also use the blender in compounding many prescriptions.

Our pharmacy is designed to meet our particular needs, but is readily adaptable for a 100 to 250 bed adult hospital. It is a unit well arranged to provide the best type of work in all areas with a minimum of effort, thereby resulting in labor saving. The pleasing colors, fluorescent lights and many windows make it a pleasant and cheerful place to work. It is, we think, an ideal pharmacy for a small hospital.

*Solution Room—Manufacturing Area showing mixing, filtering and flask filling.*



*an example of interprofessional relations*

# INCREASING PROFESSIONAL SERVICE

## BY REPORTING TO YOUR MEDICAL STAFF ON SOME NEW DRUG PREPARATIONS

*By* PAUL G. BJERKE

IT IS apparent that the advent of many new antibiotics has complicated the treatment of infectious diseases rather than simplifying it. The growing resistance of certain of the gram-positive and gram-negative organisms to the available antibiotics as well as the possible antagonism of certain of the antibiotics when used in combination makes it even more necessary to control treatment whenever possible by careful bacteriological study. Studies made by Romansky and coworkers published in the *Medical Clinics of North America,* March 1951, compared the bacterial resistance of penicillin and streptomycin during the period 1943-1947 as compared to 1949. The bacterial strains were collected at random from patients with various types of infection. This data showed that in the case of penicillin the organisms on which penicillin exerts a bactericidal rather than a bacteriostatic effect (*beta hemolytic streptococci.* and *pneumococci*) there was no evidence of increased resistance to penicillin in 1949 as compared to 1943-47. In the case of streptomycin or dihydrostreptomycin, with the exception of coagulose-positive hemolytic *Staphylococcus aureus,* the vast majority of strains showed a marked increase in resistance to streptomycin. This raises a considerable barrier to the clinical use of streptomycin alone in most infections. Finland, Forbes, and Rantz have reported similar results with strains of coagulose-positive *St. aureus.*

Romansky has shown that bacteria will develop a resistance *in vivo* to aureomycin, Chloromycetin and Terramycin in as short a time as five days.

PAUL G. BJERKE is chief pharmacist at Luther Hospital, Eau Claire, Wisconsin.

He has also shown that resistance to aureomycin and Terramycin tends to develop in parallel fashion. Thus, certain strains exposed to either aureomycin or Terramycin will develop resistance not only against the antibiotic that it is exposed to, but also against the other member of the pair. This is confirmed by Herrell and his coworkers who also included Chloromycetin in this parallelism although Romansky found this to occur only occasionally with Chloromycetin. Eagle has shown the synergistic action of bacitracin and penicillin in experimental syphilis, and Pulaski and Borolossy have shown synergy with various of the other antibiotics plus the sulfonamides. On the other hand, Jawetz has suggested by *in vitro* and *in vivo* studies in mice that certain of the antibiotic combinations may be antagonistic. It should be remembered that the premise of antagonism is based mainly on the concept that the newer antibiotics are primarily bacteriostatic.

Romansky has done some interesting work with combinations of antibiotics. From it, he has concluded, that although combinations of antibiotics should not be used routinely there are certain indications for the use of antibiotic combinations. For example, in infections due to *Escherichia coli* in which initial therapy with a single antibiotic is unsuccessful, aureomycin and Chloromycetin, Chloromycetin and streptomycin, or aureomycin and streptomycin may be satisfactory.

If I have tended to confuse the antibiotic picture, I hope I have made clear that much work remains to be done in this field and that the indiscriminate use of antibiotics individually or concurrently, is not desirable until clear-cut indications are established.

## CHOICE OF PENCILLIN

Progress in the antibiotic field has been rapid with every major company assigning a large part of its research to this field. A few weeks ago I wrote Drs. Keefer, Putnam, and Herrell, to get their opinions on four questions. Since they are authorities in this field, I will present their views to you. The first question was, "What is the best type of penicillin preparation to use routinely for acute or severe infections?" The answer to this question by all three was, "The aqueous preparations of procaine penicillin for most infections and when unusually high levels of penicillin are needed the aqueous solutions of sodium or potassium penicillin are used." I would like to commend the staff in this regard because they have, for the most part, used one type of fortified aqueous prolonged acting penicillin. This has been, no doubt, the best available. This has not only saved your patient money because of massive buying power by the Pharmacy, but has also eliminated error and confusion on the part of the nurses.

## ORAL PENICILLIN

The second question asked was, "Of what value is oral penicillin?" The opinions varied, and I shall give them to you briefly. Dr. Keefer's reply referred to Vol. 9, No. 2, February 1951 issue of *Postgraduate Medicine* in which he states:

> To understand why penicillin has not been used more widely for oral medication it is necessary to know something about the background and development of penicillin therapy. At the beginning there was very little penicillin available for clinical trial. It was an impure but nontoxic product and relatively unstable when compared to the crystalline penicillin. Moreover, preliminary studies showed that some of the penicillin ingested by mouth was inactivated by the acid gastric juice. It was demonstrated, however, that penicillin was absorbed from the gastrointestinal tract and in patients with achlorhydria the amount absorbed was greater than when the contents of the gastric juice were acid. McDermott found, however, that only a small amount of penicillin ingested by mouth was inactivated by the gastric juice. Some was destroyed in the gastrointestinal tract and some passed with the stools. In spite of these facts it was shown that 20 to 30 percent of the penicillin was absorbed and that the plasma concentration was the same following oral administration as it was following intramuscular infections when three to five times as much penicillin was given. During a period of scarcity of penicillin its oral administration was uneconomical and wasteful. This period has passed long since.

It should be pointed out that comparable plasma concentrations of penicillin do not necessarily mean therapeutic concentrations, nor therapeutic requirements. The most important guide to therapy is the clinical response of the patient. Experience has established certain oral dosage schedules and the amount of penicillin that is needed for many infections. Aside from therapeutic efficiency it should be stressed that penicillin by mouth causes few or no disagreeable side reactions and the incidence of hypersensitivity is less than when it is injected intramuscularly.

Putnam states,

> Oral penicillin, when given in large doses, is almost equivalent to parenteral penicillin. However, since absorption of oral penicillin is variable, it is not recommended for severe conditions like subacute bacteria endocarditis where treatment is necessary for 4 to 8 weeks. For acute conditions oral penicillin is usually satisfactory when given in large doses; but if favorable response is not seen within 24-48 hours, then intramuscular penicillin should be used.

And Herrell of the Mayo Clinic states,

> There are only a few instances, in our opinion, in which oral penicillin is justified. The incidence of reaction is highest with this form of medication, and in severe

infections it is of no value. It is successfully used as a prophylactic agent in rheumatic fever. However, as a whole, we think that oral penicillin has very limited usefulness.

### ANTIBIOTIC COMBINATIONS

The third question asked was, "Is it advisable to combine the use of penicillin with Chloromycetin, aureomycin, etc?" Keefer's reply stated that he thought there was very little need to combine these antibiotics except in cases of mixed infections. I would like to quote from the same article by Keefer on the *Evaluation of Antibiotic Therapy.*

> It is common practice for physicians to use combinations of antibiotics and the sulfonamides. This is done with the hope that two agents will be more effective than one, and if the effect is not synergistic it is hoped that it will be at least additive. A number of combinations have been studied in the test tube as well as in man and many more studies are needed before we can make any precise statements concerning superior results of combined antibiotic therapy. However, there is suggestive evidence that penicillin and streptomycin are more potent when used in combination for the treatment of subacute bacterial endocarditis than when penicillin is used alone. This is especially true in cases of subactute bacterial endocarditis due to the enterococcus. Also Herrell and his colleagues have reported that aureomycin by mouth and dihydrostreptomycin intramuscularly are more effective in the treatment of brucellosis than aureomycin alone. We have had one patient with enterococcic endocarditis who was resistant to penicillin treatment alone but who responded to both penicillin and Terramycin when given together.
>
> Test tube experiments have shown further that some strains of streptococci that are resistant or are not killed by penicillin may actually grow at a greater rate or show slower killing when aureomycin or Chloromycetin is added to the medium.
>
> The interpretation of such experiments is difficult, but Hunter suggests that the explanation may be that penicillin has been shown to kill only those organisms which are in the process of active multiplication. When another agent is present, like aureomycin or Chloromycetin, that renders them static (inhibits but fails to kill), then organisms are no longer killed by penicillin.
>
> In infections where the final death of the organisms is important such as in subacute bacterial endocarditis, the combination of two drugs like streptomycin and penicillin that cause complete killing of organisms may be important. In cases where inhibition of growth of organisms is adequate for recovery, then this is most often accomplished by using one antibiotic rather than two. At least this is the implication.

Putnam takes the stand that combinations of penicillin with other antibiotics have been shown in some cases to have a synergistic effect while Herrell states that there is good evidence to show that it is not advisable to combine penicillin with Chloromycetin, aureomycin, or Terramycin. He states, "It should be combined with dihydrostreptomycin."

### CHOICE OF ANTIBIOTIC

And the last question is perhaps the most controversial. "Which do you prefer, aureomycin, Chloromycetin, or Terramycin, as the antibiotic of choice?"

In general, they stated that aureomycin and Terramycin were about on a par for the same type of infections while Chloromycetin was more specific for typhoid fever and somewhat more powerful against gram-negative organisms than the other two.

Since the work of these men with antibiotics has been so outstanding, I hope that these recent opinions have been of interest to you.

It is interesting to note that penicillin is the only antibiotic still being dispensed and prescribed in units rather than by weight. This is understandable because the standards of penicillin were developed with the use of impure and relatively crude penicillin and before the pure crystalline product had been isolated. It is now known that 1 gram of crystalline penicillin is equivalent to 1.5 million units. Therefore when 300,000 units are prescribed once daily, only 0.2 Gm. or 200 mg. are being given.

The oral administration of aureomycin, Terramycin and infrequently Chloromycetin is sometimes accompanied by epigastric distress, nausea, vomiting, and diarrhea. Greenspan and McLean administered 30 cc of aluminum hydroxide gel 15 minutes before a single oral dose of aureomycin in an attempt to control the gastrointestinal upset. However, they found that the serum aureomycin levels were greatly reduced, indicating that the aureomycin was adsorbed by the aluminum hydroxide gel. To lessen this complaint, milk or carbonated beverages are recommended before the administration of the drug.

The Council on Pharmacy and Chemistry of the American Medical Association has issued a warning statement to be included in aureomycin, Chloromycetin and Terramycin labeling. Because the antibiotics are highly bacteriostatic for many bacteria, susceptible bacteria are suppressed and *monilia* or other yeast-like organisms may replace the normal or abnormal bacterial flora. This most frequently occurs in the large bowel and is of little consequence. However, if this replacement occurs in a lung abscess, bronchial static cavity or in certain other lesions, a condition is created which may be unfavorable for the patient. Deaths from pulmonary moniliosis following therapy with the new antibiotics are known. Also instances of cutaneous moniliasis mistaken for sensitivity have been noted when the newer antibiotics were used in the treatment of disease.

A price reduction I can report to you is on Terramycin, aureomycin, and Chloromycetin capsules. All have been reduced 15 percent in price.

## NEW PREPARATIONS

Two new antibiotic products are Terramycin Octic solution with benzocaine 5 percent, propylene glycol 95 percent with 25 mg. Terramycin in 5 cc. To be released next week are a nasal solution and vaginal suppository of Terramycin. Five new drug forms of this product will be released within the next nine weeks. A suspension of Chloromycetin in a custard-like base is now available, having 125 mg. of Chloromycetin per teaspoonful. A surgical powder of aureomycin is now on the market.

The latest antibiotic, polymyxin B, was released about three weeks ago under the trade name Aerosporin. Bacteriologically, polymyxin is outstanding for its potent lethal action on many gram-negative organisms. It is not effective against gram-positive bacteria. The potency is of the same order for gram-negative organisms as is the potency of penicillin for gram-positive ones. This antibiotic is definitely bactericidal, not merely bacteriostatic. As a result of this, organisms do not normally develop resistance to it; it takes many transfers *in vitro* to decrease their sensitivity to polymyxin B even slightly; no development of resistance has been observed *in vivo;* this has important bearing on the clinical usefulness of this antibiotic. Broadly speaking, polymyxin B is indicated whenever a systemic, meningeal, enteric or local infection is caused by any of the following organisms: *Pseudomonas; Hemophilus influenzae; Aerobacter aerogenes; E. Coli; Friedlander's bacillus;* and *Shigella.* Specific conditions for which polymyxin B is used may be broken down as follows:

*By intramuscular injection*—septicemia, urinary tract, and other systemic infections due to the organisms mentioned.

*By Intrathecal injection* in meningitis due to these organisms.

*By topical application*—in burns, wounds, mucous membrane lesions, body cavities, or joints infected with the organisms mentioned; eye or middle ear infections, ostemyelitis, or pyoderma caused by these organisms. It is also indicated topically when these bacteria are causing delay in the "taking" of bone or skin grafts; and prophylactically in order to prevent contaminating any wound.

*By oral administration*—in enteric infections only. Though any of the organisms mentioned may cause an enteric infection, the most important indication for oral polymyxin B will probably be chronic bacillary dysentery due to *Shigella.* Though a number of drugs are successful in treating acute *Shigella* infections, there is a high incidence of relapse due to the development of resistance to the drug by the organism; patients tend to develop chronic conditions or become a symptomatic carriers. Polymyxin B completely eradicates *Shigella* in a few days from a high percentage of these cases.

Polymyxin B is to be given intramuscularly and intrathecally only to hospitalized patients; this restriction is necessary in order to insure ready laboratory control for patients so treated. Physicians may prescribe polymyxin B for oral use for any patient; it should be dispensed only on a physician's prescription.

Three antibiotics that show extreme promise according to Dr. Wermer of the Council on Pharmacy and Chemistry of the American Medical Association are:

(1) Fungicidin is an antibiotic which is produced by an unidentified species of *Streptomyces* and found in soil in Virginia. It has been found effective against certain types of fungus infection. Tests have revealed a minimum of toxicity at dosage levels which were both fungistatic and fungicidal.
(2) Fumeracin isolated from plants is effective on several strains of fungus and one strain of T. B.
(3) Prodigiosin has been used on the cause of amebic dysentery.

Neomycin, an antibiotic preparation available for topical use, is found to be active against a variety of both gram-positive and gram-negative organisms. Clinically, it has been found to be particularly effective in treating surface infections due to *Pseudomonas* and *Proteus* organisms. It is not active against fungi. The ointment has been found to be a useful agent for the treatment of impetigo, and secondarily infected wounds and ulcers. Applications may be made from two to five times daily. In severe or extensive infections, local therapy with Neomycin should be supplemented with sulfonamide by mouth or penicillin by injection. Neomycin ointment is well tolerated and relatively non-irritating when applied locally to the skin and conjunctiva in recommended concentrations.

## ACTH AND CORTISONE

The use of corticotropin and cortisone have been of particular interest because of the controversy that exists over their use in certain conditions and new dosage forms that recently have been or soon will be presented. I should like to evaluate

two preparations that vary greatly in cost. The *A. M. A. Journal* of September 22, 1951, gives the accepted generic name of these compounds as corticotropin. The product made by Wilson Laboratories has always carried this name, while the product of Armour Laboratories has carried the name of ACTH or ACTHAR, but in the future will be called corticotropin, brand of ACTHAR. The Armour product comes in a vial as a dry powder, storable at room temperature for indefinite periods of time. The Wilson product which has been available during the past few months, comes in solution, contains an expiration date of about 15 to 18 months, and must be stored in a refrigerator. The reason for these differences is that all brands of corticotropin are not made by the same process.

Until March 22, 1951, the potency of these products varied from brand to brand. On this date representative of the Food and Drug Administration, the U. S. P. Revision Committee, and the Council on Pharmacy and Chemistry met in Washington and set up a provisional U. S. P. unit, thus providing some assurance of uniformity among the various brands of corticotropin.

Recently there has been considerable interest in the use of intravenous injection of the adrenocorticoptropin hormone. When corticoptropin is administered by the intravenous route the dosage requirements are approximately 1/10 to 1/20 of the amount necessary by intramuscular or subcutaneous injection. Great caution must be used when the intravenous mode of administration is used. The required dose is added to 500 or 1000 cc of 5 percent dextrose solution and is administered intravenously by slow drops over an 8 to 10 hour period. The economy of this procedure is based on the fact that the patient receives a constant supply of corticotropin stimulating the natural release of adreno-corticotropic hormone from the posterior pituitary gland. Rapid intravenous injection of corticotropin does not offer an advantage over the intramuscular or subcutaneous route, since the blood level is rapidly decreased.

Armour is about to release a long-acting corticotropin preparation. The corticotropin will be suspended in gelatin similar to the long-acting heparin preparations. A new preparation of cortisone now available is an ophthalmic ointment.

It is interesting to note that for several months we have prepared a cortisone eye solution, which is now available commercially except that it is more expensive than that prepared in our department and moreover the entire stock of a major company is now being recalled because of contamination in certain batches of the product.

**WASHABLE OINTMENT BASE**

I should like to present to you an aqueous emulsion formula for use as a suspending medium. The vehicle is compatible with calamine, zinc oxide, precipitated sulfur, salicylic acid, oil of cade, ammoniated mercury, phenol, menthol, boric acid, benzocaine, resorcinal, red mecuric oxide, starch, and ichthammol. This base cannot be considered as a universal base for any given substance because occasionally an oil base may be required as part of the treatment. In this formula the product is an oil-in-water emulsion and will be advantagous to use for several reasons. Its application to the skin will make it, by virtue of its aqueous base, easy to rub into the skin, the medicament will disappear into the skin rapidly. The base owes its virtue to the presence of Spans and Tweens which act as emulsifying agents and surface tension depressants.

It makes a stable preparation, cosmetically acceptable, especially to women. This washable base can readily be removed from skin and clothing with water. Penicillin, being fairly unstable in an aqueous medium, cannot be commercially prepared in these emulsion type bases; however, the physician may prescribe penicillin in this base and obtain superior results. Many substances which are practically non-absorbed from other type bases show marked absorption from this type of emulsion base. I have this formula available, should any of you desire it, but to show you the appearance of a few substances suspended in this vehicle, I have prepared a few samples which I would be happy to have you inspect.

In closing, I will mention a few products that have recently been released or are about to be released. Cumopyrin is a synthetic anti-coagulant developed by Link at Wisconsin and has the advantage over dicumarol, of having a more rapid onset, the action is more prolonged, and is more potent, with less drug saturation of tissues during administration. Tycopan, a combination of vitamin factors in high dosage as recommended by Dr. Roger J. Williams, will soon be released to treat chronic alcoholism. Dromoran, a synthetic-like morphine, is available and is recommended for alleviation of pain in terminal cancer. Tensilon, a curare antagonist, acts in 30 to 60 seconds and lasts only 5 to 15 minutes. It has the advantage over Prostigmin, in this respect, because it acts faster and has only brief duration. Dormison, a hypnotic composed of carbon, hydrogen, and oxygen, is available in 250 mg. capsules. Sleep is induced in 5 to 30 minutes and the effects last about one to two hours. The drug may be considered as one to assist or accelerate the process of sleep.

# CURRENT LITERATURE

*Edited by* SISTER MARY ETHELDREDA, *St. Mary's Hospital, Brooklyn, N.Y.*

### *American Professional Pharmacist*

MARCH, 1952—"Drugs We Take for Granted" by W. B. Baker. A review of currently used drugs and their properties. *page 241*

'Retail and Hospital Pharmacists Talk Things Over." A frank panel discussion on current problems at a Michigan A.Ph.A. Branch meeting. *page 254*

APRIL, 1952—"Hospital Pharmacy in France" by Docteur Jean Cheymol. Presents the legal status of the profession, the recruitment of personnel, the chief pharmacist's role and prerogatives and the relationship with other branches of pharmacy. *page 346*

### *Hospital Management*

MARCH, 1952—"How Can the Hospital Get a Good Pharmacist" by Herbert L. Flack. Describes educational background, training, experience and availability of competent pharmacists for hospital work. *page 108*

APRIL, 1952—"New Pharmaceutical Developments in U. S. Army Hospitals," by Major General George E. Armstrong, the Surgeon General, U. S. Army. Describes the Medical Research installations and the specific problems and projects which formulate the program of this unit especially arising from the current operations in Korea. *page 84*

### *Hospital Progress*

MARCH, 1952—"News Miscellany." Highlights of the Durham-Humphrey Bill are presented. Objectives of the Catholic Pharmaceutical Guild for the diocese of Brooklyn enumerated. *page 74*

APRIL, 1952—"Focusing Minimum Standards" by Sister Mary Bernadine. Presents the requirements of the Secretary of the Board of Pharmacy of the State of New York for pharmacy registration. Recommends their application for a critical evaluation in meeting minimum standards. *page 76*

### *Hospitals*

APRIL, 1952—"Standardization" by Malcolm T. MacEachern, M.D. Tells the story of how an idea grew and laid the foundations for the new Joint Commission on Accreditation of Hospitals. Traces development of The Minimum Standard. *page 58*

"Using a Vegetable Crisper for Storing Medicine Vials." Describes with illustration the idea of keeping medicine vials in an ordinary refrigerator vegetable crisper. *page 69*

"Elements of the General Hospital"—Revised Edition. Presents a complete list of detail drawings of architectural plans for all hospital departments. A revised plan for a pharmacy for a 50, 100, and 200 bed general hospital. *page 92*

### *Modern Hospital*

APRIL, 1952—"The Origin of the Concept of Neurohumoral Transmission" by Bruno Minz, M.D. A historical presentation of the physiology and the corresponding pharmacological concept of the action of the chemicals liberated at the ganglia and postganlionic fibers of the autonomic nervous system. *page 98*

### *Southern Hospitals*

APRIL, 1952—"Planning a Hospital Pharmacy," by Mary Wernersbach. A brief yet accurate description of essentials to be considered in planning a pharmacy for a 50 to 100 bed and a 100 to 200 bed hospital. Necessary equipment and useful suggestions to facilitate operation also enumerated *page 58*

### *J. Am. Pharm. Assoc., Pract. Pharm. Ed.*

MARCH, 1952—"A study of Aromatic Water Prepared by Solublizing Oils" by Carroll V. Steen, *et al.* Application of Tweens to the preparation of aromatic waters is studied. *page 180*

APRIL, 1952—"New Formulas for Calamine Lotion and Phenolated Calamine Lotion" by Samuel W. Goldstein. Presents a new formula for preparing Calamine Lotion using methylcellulose as the suspending agent. *page 251*

### *The Hospital Pharmacist (Canada)*

JANUARY-FEBRUARY, 1952—"The Hospital Pharmacist—An Aid to Internes and Nurses" by F. D. Buck. Points out ways in which the pharmacist can be helpful to nurses and interns. *page 33*

# Graduating INTERNS in Hospital Pharmacy

**MR. CLIFTON J. LATIOLAIS** is a candidate for the degree of Master of Science in Hospital Pharmacy from the University of Michigan in June, 1952. He began the two year internship program at the University Hospital some time after graduating from Loyola University College of Pharmacy in New Orleans in 1949, with his Bachelor of Science degree. The intervening year was spent in retail pharmacy in Lafayette, Louisiana. He is a native Louisianian, born in 1926. During World War II he served in the Army Air Corps. He is a member of Rho Chi, American Pharmaceutical Association, and the American Society of Hospital Pharmacists. In June, he will assume the duties of assistant chief pharmacist at the University of Chicago Clinics, where he will work with Mr. Paul Parker, a recent graduate in hospital pharmacy at the University of Michigan.

**MR. FRANKLIN D. COOPER** will complete the joint program of graduate study and internship in hospital pharmacy offered by the University of Maryland and the Johns Hopkins Hospital, in June of this year. He was born in Greenville, South Carolina, October 1920, and after graduating from high school, entered the U. S. Navy, serving with the Hospital Corps for six years. The Bachelor of Science degree in Pharmacy was conferred on Mr. Cooper by the Rhode Island College of Pharmacy and Allied Sciences, Providence, Rhode Island, in June 1950, and experience in retail pharmacy was gained in that city. He is married, and is a member of the American Pharmaceutical Association and the American Society of Hospital Pharmacists.

**MR. JOHN S. LINDSAY,** one of the Senior Pharmacy Interns at Jefferson Medical College Hospital, Philadelphia, was born in Watertown, New York on March 8, 1927. He received his Bachelor of Science in Pharmacy degree from Union University, Albany College of Pharmacy, Albany, New York in June, 1950. Mr. Lindsay served in the Hospital Corps of the United States Navy during World War II and presently holds a Commission in the Medical Service Corps of the United States Naval Reserve. He is a member of The American Pharmaceutical Association, The American Society of Hospital Pharmacists, Rho Chi Honorary Pharmaceutical Society, and Kappa Psi Pharmaceutical Fraternity.

**MR. C. SHERMAN FORD,** senior intern at the University of Michigan Hospital, on completion of graduate study and formal internship in hospital pharmacy in January, 1953, will receive the Master of Science degree. Mr. Ford received his Bachelor of Science degree in Pharmacy from Purdue University, School of Pharmacy in June, 1949. A native of Indiana, Mr. Ford was born in 1926 and is married. He served in the Navy during World War II. His experience prior to internship included two years in the retail field in Indiana, including work in both professional and chain store pharmacies. He is a member of the American Pharmaceutical Association, the American Society of Hospital Pharmacists, the Michigan Society of Hospital Pharmacists, and the Indiana Pharmaceutical Association.

**MR. JACK L. SUMMERS** was born in Saskatoon, Saskatchewan in 1919. His early education and three years' apprenticeship in retail pharmacy were received in Wilkie, Saskatchewan. During the war he served five and one-half years in the Canadian Army, and saw action in the northwest European campaign with the four Canadian Armored Division. At the present time he holds the rank of Major in the Canadian Officers' training Corps. On graduation from the Saskatchewan University College of Pharmacy in 1949, with the degree of Bachelor of Science in Pharmacy, Mr. Summers accepted a position on the staff of that College. He obtained leave in 1951 to attend the State University of Iowa, where he is majoring in hospital pharmacy. He will receive his M.S. degree in August. Mr. Summers is a member of the Saskatchewan Pharmaceutical Association, the Canadian Society of Hospital Pharmacists, the A. Ph. A., and the ASHP.

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**ANGELINA ARENAS** is one of the Pharmacy Interns at the Jefferson Medical College Hospital, Philadelphia, Pa. She was born in Laguna, Philippines and received the Bachelor of Science degree from the University of the Philippines College of Pharmacy. She was pharmacist-in-charge of a National Hospital in the Philippines from August, 1947 until the summer of 1950 when she joined the hospital pharmacy program at Jefferson. She will receive the degree of Master of Science from the Philadelphia College of Pharmacy and Science in June, 1952. Following this, she expects to return to the Philippines and may serve in the Bureau of Hospitals, Department of Health. Miss Arenas was awarded membership in the Rho Chi Honorary Pharmaceutical Society from the College. She is member of the American Pharmaceutical Association and the American Society of Hospital Pharmacists.

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**MR. JOHN M. FOLMER** is a senior intern at the University of Michigan Hospital, and will receive the degree of Master of Science in Pharmacy from that University this June. A native of Reading, Pa., Mr. Folmer received his Bachelor of Science in Pharmacy degree from Temple University in June, 1950. He served his apprenticeship in The Reading Hospital pharmacy, and has had retail drug store experience. A veteran of World War II, Mr. Folmer served for three and one-half years as a Pharmacy Technician in the Army Medical Corps. His Graduate School curriculum includes courses in Personnel Administration and Medical Economics, and an investigational project involving Minimum Standards for Pharmacies in Hospitals. Mr. Folmer is a member of The American Pharmaceutical Association, The American Society of Hospital Pharmacists, Kappa Psi Pharmaceutical Fraternity, and Phi Lambda Upsilon Honorary Chemical Society.

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**MR. CARL E. BECK** will complete the academic internship program conducted jointly by the University of Maryland School of Pharmacy and the Johns Hopkins Hospital on June 30, 1952. His thesis subject is an evaluation of paper wrappers for materials to be sterilized. Mr. Beck received his Bachelor of Science in Pharmacy from the University of Kentucky College of Pharmacy in June 1950. He has had pharmaceutical experience in commercial and professional stores, as well as experience in a hospital in Louisville. He is registered in Kentucky as a pharmacist. A native of Kentucky, Mr. Beck was born in Louisville on May 30, 1922 and is married. During World War II, he was a member of the U. S. Air Force for thirty-six months. Mr. Beck is a member of Rho Chi Honorary Pharmaceutical Society, the American Pharmaceutical Association, and the American Society of Hospital Pharmacists.


# THERAPEUTIC TRENDS

*New trends in medicine and pharmacy include INTRAVENOUS IRON — EGRESSIN — HEXAMETHONIUM CHLORIDE — METHYLANDROSTENEDIOL IN BREAST CANCER — ORAL DIURETIC — TIBIONE — MERCURIAL DIURETICS IN BROMIDE INTOXICATION — DISULFIRAM*

*Edited by* LEO F. GODLEY

**Intravenous Iron Carbohydrate**

A high molecular weight ferric carbohydrate equivalent to 20 mg. of elemental iron per cc. of sterile solution was used in this study. The solution is stable and has a *p*H of 7.3. It has been extensively investigated in Sweden.

In this report, appearing in *Blood* 7:358 (March) 1952, twenty patients with hypochromic anemia were given a total of 211 intravenous injections of this compound. Indications for parenteral iron therapy as set forth by these investigators are: (1) in iron deficiency anemias that have not responded to oral therapy; (2) in tolerance to orally administered iron; and (3) in late pregnancy where existing anemia can be more expeditiously treated parenterally than orally.

The initial dose was calculated to include from 25 to 50 mg. of elemental iron and successive daily doses did not exceed 200 mg. The dose should be carefully calculated with reference to hemoglobin level so that excess iron not be given. Of the 17 patients who elicited a definite hematologic response, six were pregnant. The overall hemoglobin increase was calculated to be 0.16 Gm. percent per 24 hours.

Toxic reaction associated with the intravenous administration of iron are nausea, vomiting, aching of muscles, chills and fever. None of the individuals in this series encountered reactions severe enough to warrant discontinuance of therapy.

**Egressin, Treatment For Pinworms**

Egressin is a substituted thymol compound. It has a thymol like odor and is poorly absorbed from the gastrointestinal tract. Alcohol and fats increase its absorption.

Goddard and Brown, reporting in *J. Pediat. 40*: 460 (April) 1952, present a study of 42 patients infected with *Enterobius vermicularis*. These patients were in an age group from 1 to 50 years. The treatment consisted of three doses of two grams each for patients over 10 years of age and for those under 10 years, one gram was given after each meal. Tablets may be crushed or eaten in applesauce. Chewing is not advised since the chemical is irritating to oral mucosa. One day before and after treatment, no fatty foods or alcoholic or carbonated beverages are allowed since this tends to increase absorption of the medicinal ingredient from the gut. Smoking seems also to be contraindicated.

The cure rate in this series of patients was 42 percent. Of ten patients who were not cured a second two day treatment resulted in a 60 percent cure rate. While other drugs may be more effective, this remedy may have merit in that the treatment is shorter. It might also be of value in patients who do not respond to other types of therapy.

**Hexamethonium and l-Hydrazinophthalazine**

Hexamethonium Chloride ("Methium"-Chilcott) an apparently innocuous ganglionic blocking agent is given along with l-hydrazinophthalazine ("Apresoline"-Ciba) a new antihypertensive drug used in reducing elevated blood pressure.

Schroeder, working in St. Louis, and reporting in the A.M.A. *Arch. Int. Med. 89*:523 (April) 1952, indicates that the two drugs act synergistically. The dosage routine employed by this investigator consisted of 125-250 mg. hexamethonium every 8 hours and this dose was increased gradually to 500 mg. every four hours or until the blood pressure fluctuated within normal range. At this time l-hydrazinophthalazine was begun in 25-50 mg. doses every eight hours, increasing to 100 mg. every four hours or until the blood pressure had become normal.

These drugs were given to 40 hypertensive patients of all degrees of elevation; and they were treated both as in- and outpatients. Benign arterial hypertension responded successfully to this treatment, while malignant cases responded in variable fashion, though some cases were satisfactorily controlled.

Toxicity of the two drugs was noted in that in some cases the hexamethonium produced undesirable effects of autonomic paralysis and the l-hydrazinophthalazine, which depresses histaminase activity, may produce headache. Overdosage must be guarded against and physicians, in using these drugs, are cautioned to familiarize themselves thoroughly with potentialities of these therapeutic agents, since it is always possible to precipitate a cardiovascular accident.

**Methylandrostenediol in Breast Cancer**

Kasdon *et al* working in Boston reported this "critical evaluation" of methylandrostenediol in palliative treatment of breast cancer in *J. Am. Med. Assoc. 148*:1212 (April, 5) 1952.

In a group of 44 patients with far advanced inoperable cancer of the breast, these investigators report definite improvement in 30 cases. There was no improvement in 14 cases under methylandrostenediol therapy. Aqueous and oleagineous injectable preparations, implantation pellets, and oral tablets were used in this study. Blood work on these patients included routinely: NPN, total protein, calcium, phosphorous, and alkaline phosphatase determinations. x-ray and pathological examinations were done as indicated.

The amount of testosterone necessary to produce equivalent results would have caused severe hirsutism, acne, voice changes, and virilization in many cases. Hypercalcemia was the most undesirable side effect encountered on methylandrostenediol therapy.

**New Oral Diuretic**

Clinical observations on a new oral, non-metallic diuretic, l-propyl-3-ethyl-6-aminouracil, was reported in *Am. J. Med. 310*:12, (March) 1952. The code number given this chemical was 2614.

Studies indicate that 2614 produces its diuretic action by inhibiting the resorption process of the tubular mechanism with respect to sodium and potasssium. This action is apparently equivalent to that of the mercurial diuretic compounds. The optimum dose appears to be one gram daily given in divided doses.

A valid comparison of this drug with the mercurial diuretics cannot be made at the present level of information. The advantages are that it is effective when given by mouth; side effects encountered consisted of mild gastric discomfort and did not warrant discontinuing therapy; and it can be given without danger where active renal disease is a complicating factor.

Patients with edema due to cardiac failure, renal disease and cirrhosis of the liver were treated; 54 percent had excellent therapeutic effect. Both inpatients and outpatients were successfully treated.

**Tibione In Leprosy**

There have been reports indicating that the drug known as TB-1 is toxic and not well tolerated. However, early investigators have suggested that possibly patients with leprosy tolerate TB-1 much better than patients with tuberculosis. Chemically, TB-1 is *p*-acetamido-benzaldehyde thiosemicarbazone, and is also known as Conteben, Tibione and Berculon A. A british investigator reporting in *Lancet* (London) *1*:438 (Mar. 1, 1952), describes the results of treating 71 patients between five months and thirteen months. Apart from one case of acute agranulocytosis, no serious toxic effects were seen. The treatment was well tolerated, and complications of treatment were few and usually not severe. Clinical and bacteriological response was satisfactory. It was also compared with sulphone treatment, the results of the two treatments appearing similar, and some of the complications seemed rarer using TB-1. It is believed that TB-1 should be a valuable alternative treatment to sulphone if agranulocytosis is found to be rare.

**Mercurial Diuretics In Bromide Intoxication**

The clinical entity of bromide intoxication has not responded too favorably to treatment thus far in common use. This treatment consists of the administration of sodium chloride.

These investigators reporting in *Am. J. Med. Sci. 223*:262 (March) 1952, found that by the addition of a mercurial diuretic to the sodium chloride therapy, the bromide ion was more rapidly eliminated. The rationale brought forth in this report involves a twofold explanation: (1) increase in urine volume, and (2) increase in halide excretion. There was no further attempt to explain the mode of action of mercurial diuretics except that they inhibit tubular resorption.

It was noted that ammonium chloride was as effective as sodium chloride, in helping to eliminate the bromide ion, when given in conjunction with the mercurial diuretic.

**Disulfiram**

The Subcommitte on Nonproprietary Names of the World Health Organization Expert Committee on the International Pharmacopoeia has approved "Disulfiram" as a common name for the drug, tetraethylthiuram disulfide, proprietary names of which include Antabuse, Abstinyl, Antietil, Aversan, Esperal, Refulas, etc.

—*Quart J. Studies Alc. 13*:165 (Mar.) 1952.

# A Ph A centennial

# ASHP decennial

## Philadelphia August 17-23

PHARMACISTS from all parts of the country as well as foreign visitors will participate in the Centennial of the American Pharmaceutical Association during the week of August 17 in Philadelphia. This will be followed immediately by the tenth anniversary meeting of the American Society of Hospital Pharmacists. Although the ASHP House of Delegates is scheduled for Sunday, August 17 at 2 P.M., all other meetings will be held on Thursday and Friday, August 21 and 22, exactly ten years from the date the Society was officially organized and accepted as

an affiliate of the American Pharmaceutical Association.

Special events scheduled in connection with the A.Ph.A.'s Centennial offer a program which will be outstanding in every way. Hospital pharmacists will want to participate in this important event in Pharmacy and make every effort to be present during the week.

The general schedule for the ASHP meetings will be as follows:

*Sunday, August 17—2 P.M.*—House of Delegates

*Thursday, August 21—8 A.M.*—ASHP Breakfast

*Thursday, August 21—1 P.M.*—First Session

*Thursday, August 21—8 P.M.*—Second Session

*Friday, August 22—9 A.M.*—Third Session (Special Decennial Events)

*Friday, August 22—1:30 P.M.*—Fourth Session

*Friday, August 22—7 P.M.*—Informal Banquet

**FOREIGN VISITORS**

Two foreign visitors, Herbert Grainger from Westminster Hospital in London and Dr. K. Steiger, Kantons-Apotheke, Zurich, Switzerland, have been invited as guests of the Society for this Decennial meeting. Both of these men are outstanding hospital pharmacists and we anticipate unusual contributions on various phases of pharmaceutical practice in their countries. Also, both of these men will participate in the International Congress of Hospital Pharmacists to be held in Basle, Switzerland in September. In replying to our invitation Mr. Grainger said, "I am greatly honoured by the generous invitation conveyed through your president to participate in the Decennial meeting . . . In thus honouring me you have honoured my colleagues in hospital pharmacy in Britain and indeed, the British pharmaceutical profession . . ."

**PROGRAM**

Highlights of the Decennial meeting will be presented on Friday morning when the foreign visitors will give papers and there will be greetings from the various allied organizations, including the A.Ph.A., the American Hospital Association, the Catholic Hospital Association, the Canadian Society of Hospital Pharmacists and others. Also at this time, Dr. Austin Smith, editor of the *Journal of the American Medical Association,* will review drug therapy over the past ten years. His subject will be "The Effect of Modern Drug Therapy on Life."

The Society's Committee on Program and Public Relations has made every effort to make this an outstanding event. This committee has been assisted by the Special Advisory Committee made up of the past presidents; a committee appointed to assist with the Decennial events, including Evlyn Gray Scott, Geraldine Stockert and Herbert Flack; and a local committee representing the Philadelphia Society.

Scheduled during the two-day session is a paper on "The Hospital Pharmacist's Role in the Support of Sound Drug Therapy" prepared by J. Solon Mordell, senior pharmacist, U. S. Public Health Service, Office of the Surgeon General, Washington, D. C., and C. K. Himmelsbach, M.D., medical director, U. S. Public Health Service,

medical officer in charge, PHS Outpatient Clinic, Washington, D. C. Mr. Mordell is a charter member of the Society and was active in the A.Ph.A.'s Subsection on Hospital Pharmacy prior to organization of the Society. He has been a practicing hospital pharmacist and has made many contributions to the literature.

Among the other important subjects to be presented will be a discussion of a Proposed Point Rating System based on the *Minimum Standard for Pharmacies in Hospitals.* This will be given by Mr. M. R. Kneifl, executive secretary of the Catholic Hospital Association. The plan as proposed by Mr. Kneifl has been worked out in cooperation with the CHA's Committee on Hospital Pharmacy Practice and has been studied during the past year as a means for self evaluation of pharmaceutical services in hospitals.

Other speakers during the two--day Decennial meeting will be J. Robert Cathcart, chief pharmacist at The Wilmington Hospital, Wilmington, Del.; Alex Milne of the Hospital Facilities Division of the Public Health Service, Washington, D. C.; H.A.K. Whitney, first chairman of the Society and now chief pharmacist at Receiving Hospital in Detroit, Mich.; George Archambault, chief of the Pharmacy Branch of the Hospital Division of the Public Health Service, Washington, D. C.; Harold Jones, hospital pharmacy inspector, Indiana State Board of Health, Indianapolis, Ind.; Dr. Samuel Hopper, associate professor of Public Health, Indiana University Medical Center, Indianapolis, Ind.; Sister Mary John, chief pharmacist at Mercy Hospital in Toledo, Ohio; and Serge A. Birn, consulting management engineers, Louisville, Ky.

Scheduled also again this year will be a joint meeting with the teachers of hospital pharmacy which will be under the direction of Dr. W. Arthur Purdum, chairman of the ASHP Committee on Education.

#### BANQUET

Climaxing the two-day meeting will be an informal banquet on Friday night, the theme of which will be *Ten Years of the American Society of Hospital Pharmacists.* At this time the past presidents will be honored and special recognition will be given the Society's two honorary members, H.A.K. Whitney and Dean Edward Spease. Tribute will be paid to leaders through the years and highlights of the Society's history presented. Special guests will include representatives of the various allied pharmaceutical and hospital organizations and our foreign visitors. Dr. George Urdang, director of the American Institute of the History of Pharmacy will be the principal speaker. Dr. Urdang is well known internationally as an outstanding historian in the field of pharmacy and the Society is fortunate to have him participate in the Decennial meeting.

#### HOUSE OF DELEGATES

For the first time in the Society's history, the president-elect will present an address at the House of Delegates meeting. As outlined in the Constitution and By-Laws, the House is made up of the executive committee, the chairman of each special committee and delegates from the affiliated chapters and fraternal delegates. Delegates are asked to present annual reports in writing and to be prepared to bring before the group any recommendations or resolutions from the affiliated chapters. It is important that Society business be brought before the House prior to the general sessions.

#### LOCAL COMMITTEE

Playing an important role in making local arrangements will be the Philadelphia Hospital Pharmacists Association. The local committee is headed by Mr. Benjamin Wexlar of the Philadelphia General Hospital. Others serving on the committee include Miss Thelma Connolly of the Frankford Hospital, Sister Mary Gentilla Olender, Nazareth Hospital, and Herbert Flack, Jefferson Medical College Hospital. The Philadelphia Society will sponsor the traditional breakfast on Thursday morning and other entertainment will be scheduled during the week. The local group has expressed interest in being helpful in making your visit in their city enjoyable. If you will let Mr. Flack know when you expect to arrive, members of the local group will arrange to meet you and take you to your destination. Hospital pharmacists will be housed at the Bellevue-Stratford and Adelphia Hotels and the Society will have a room available throughout the week at the headquarters hotel where hospital pharmacists and their friends may meet.

*Come to Philadelphia*

*August 17 - 23*

*A Ph A Centennial*

*A S H P Decennial*

# TIMELY DRUGS

**BACITRACIN** . . . in the form of an ophthalmic ointment and a topical ointment have been placed on the market by Chas. Pfizer and Company, Inc. Both products contain 500 units of bacitracin suspended in each gram of ointment and both are stable for at least 18 months at room temperature. The topical ointment comes in one-half ounce tubes while the ointment for use in the eye is to be sold in one-eighth ounce tubes. The topical form of the antibiotic is indicated for pyogenic infections of the skin such as infected wounds, ecthyma, impetigo and eczematoid dermatoses. The ophthalmic dosage form of bacitracin is intended for use in the prophylaxis and local treatment of such superficial ocular infections as conjunctivitis, blepharitis, and corneal ulcer. Since the incidence of allergies to bacitracin ointment has been virtually negligible, these two products may be used safely in the majority of cases over long periods of time.

* * *

**CILLORAL 250 POWDER** . . . is a preparation of Penicillin G Powder available from Bristol Laboratories. A solution containing 3,000,000 units of Penicillin G Potassium buffered with sodium citrate is supplied for preparing the oral preparation. With the addition of 42 cc. of water by the pharmacist to the 60 cc. size bottle, the resulting solution will contain 250,000 units of Crystalline Penicillin G Potassium per teaspoonful (5 cc.). The solution must be kept in the refrigerator and there will be no significant loss of potency up to one week. The patient must be advised to discard any portion remaining at the end of the week. In the dry state, the powder requires no refrigeration.

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**DICALETS** . . . is a new Abbott product supplying vitamins and minerals for pregnancy and lactation. Two Dicalets three times daily provide 100 percent of the recommended daily dietary allowances of vitamins A, D, $B_1$, $B_2$, C, nicotinamide, iron, calcium and phosphorus, plus vitamin $B_{12}$, folic acid, pyridoxine and several trace minerals. Dicalets contain synthetic A, which obviates fish-oil oder, taste and regurgitation.

* * *

**DROMORAN HYDROBROMIDE** . . . is now supplied by Hoffmann-La Roche in bottles of 1,000 tablets, 5 mg. each. Dromoran is now being used extensively to replace morphine for longer-lasting relief of severe pain.

* * *

**GEVRAL** . . . Lederle's Geriatric Vitamin-Mineral Capsules, are now available in a smaller bottle size. Previously packaged in bottles of 100, 250 and 1,000, they are now also obtainable in bottles of 30 capsules. In addition to the standard multivitamins, the formula contains Folic Acid, Vitamin E, Vitamin $B_{12}$, Boron, Rutin, Copper, Phosphorous, Manganese and Iodine. The addition of these ingredients and other trace minerals makes Gevral capsules a complete and balanced nutritional supplement.

* * *

**NORMOCYTIN** . . . is now available in a new strength according to announcement by Lederle Laboratories. Used in treatment of pernicious anemia, each cc. of Normocytin contains 60 micrograms of a concentrate of vitamin $B_{12b}$ and $B_{12}$ prepared from *streptomyces* fermentation.

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**RONIACOL ELIXIR** . . . is a new liquid vasodilator providing 50 mg. of Roniacol per teaspoonful in a port wine flavored vehicle. Supplied by Hoffmann-La Roche, Roniacol is useful in various vasospastic disorders, including some cases of angina pectoris. It is supplied in 16 ounce and one-gallon bottles.

**STAPHYLOCOCCUS AMBOTOXOID . . .** is an improved dual antigen incorporating the detoxified exotoxin of Staphylococcus and the endotoxic principles of the organisms themselves, available from E. R. Squibb and Sons. A lack of comparable results in other staphylococcal immunizing preparations led specialists to request reinstatement of this product.

Staphylococcus Ambotoxoid is prepared from the reaction of a specific bacteriophage (virus) with the staphylococcus. It contains all parts of the bacteria as well as their toxins and thus provides active double immunity by stimulating both antitoxic and antibacterial defenses. Its greatest usefulness is in treating conditions which are not permanently benefited by antibiotics or sulfonamides.

Staphylococcus Ambotoxoid is thought to produce two effects in patients. It stimulates the patient's own defense mechanism against repeated staphylococcal infections, and it reduces the allergic response to staphylococcal infection in patients who have a chronic condition caused by hypersensitivity to this organism.

Staphylococcus Ambotoxoid is of greatest value in treating chronic staphylococcal infections and in preventing recurrent infections. The chronic processes for which it is recommended are: Chronic eczemas of the skin, chronic infections of the hair follicles, chronic otitis of the ear canal, etc. It is also recommended to prevent recurrent attacks of boils, carbuncles, pustular acne, and other recurrent migratory localized staphylococcal abscesses of the soft tissues.

Staphylococcus Ambotoxoid is administered by injection either intradermally, subcutaneously, or intramuscularly at intervals of 1 week. Stokes recommends that injections of amounts less than 0.2 cc. should be made interdermally on the skin of the forearms, alternately. Injections of larger amounts than 0.2 cc. are usually made subcutaneously into the deltoid area.

Where no evidence of sensitization or bacterial allergy exists, as in simple furunculosis, the following simplified scheme of dosage is suggested: 0.05 cc., 0.1 cc., 0.15 cc., 0.2 cc., 0.25 cc., 0.3 cc., 0.4 cc., 0.5 cc.

In resistant cases additional injections may be given and the dosage gradually increased to 1 cc. Where practical, it is advantageous to give the earlier small doses diluted in about 0.3 cc. of sterile distilled water or isotonic solution of sodium chloride.

To insure accurate measurement, a 1-cc. tuberculin or vaccine syringe is recommended.

Staphylococcus Ambotoxoid should not be used where there is Staphylococcus septicemia. In such conditions antibiotics are indicated.

Staphylococcus Ambotoxoid is supplied in 5-cc. rubber-capped vials. Each cc. contains the toxoid derived from at least 1,000 necrotizing doses of toxin together with at least 2,000 million lysed Staphylococci.

* * *

**TOLAMIC . . .** is a combination of Mephenesin and Glutamic Acid Hydrochloride in capsule form available from Kremers-Urban. Recent clinical reports proved that administration of this combination was effective in many patients who did not respond to Mephenesin alone. It is believed that the Glutamic Acid increases the solubility and rate of absorption of Mephenesin.

Tolamic capsules are indicated in the treatment of: anxiety states; acute alcoholism; rheumatoid arthritis, rheumatoid spondylitis, osteo-arthritis of spine, lumbrosacral sprain, strain, lumbago, fibrositis, acute and chronic bursitis and acute torticollis. The dosage of Tolamic is as follows: In the treatment of rheumatic diseases, an initial morning dose of four to six capsules should be given 30 minutes before breakfast with one or two glasses of water followed by two or three capsules every two to three hours throughout the day. In anxiety states, two to four capsules may be administered four times a day according to the needs of the patient. In the treatment of alcoholism, it is recommended that four capsules be administered from three to five times a day spaced throughout the waking hours. If there is no response in 72 hours, the medication should be discontinued.

* * *

**SYNKAVITE-CB LOZENGES . . .** is a Hoffmann-La Roche preparation which provides Synkayvite (vitamin-K compound) for prevention of delayed hemorrhage, vitamin C for promotion of wound healing and B-complex factors for reinforcing the nutritional status of the patient. Synkavite-CB Lozenges are cherry-flavored and are especially valuable in young patients following tonsillectomy when swallowing may be difficult.

* * *

**VERENTERAL . . .** a new biologically standardized extract of Veratrum Viride, has been introduced by Irwin, Neisler and Company. Verenteral is used as a lifesaving drug in the treatment of pre-eclampsia and eclampsia. Given by intravenous infusion, Verenteral produces a dramatic fall in blood pressure to the desired normal level, effecting a decisive therapeutic response.

## *as the president sees it*

WALTER M. FRAZIER

*Springfield City Hospital, Springfield, Ohio*

We are very pleased to announce that the Georgia Society of Hospital Pharmacists, and the North Carolina Society of Hospital Pharmacists are now affiliated chapters of ASHP. Our best wishes and a warm welcome to the officers and members of these fine organizations. There are now 31 ASHP Chapters and we expect to have several more during this anniversary year. It will be encouraging and particularly beneficial to have delegates from every chapter attend the ASHP House of Delegates meeting on Sunday afternoon August 17th, which is the first day of the A.Ph.A. Centennial Convention at Philadelphia.

The continued response to the Decennial Fund is a fine example of your loyal support of the Society. I send my personal thanks to all members and chapters who have taken part. We are confident that all will benefit by the Decennial program and related activities.

On May 4th a meeting was held in Springfield, Ohio, to complete plans for our annual meeting and Decennial Celebration. Those attending were Members Niemeyer, Rogan, Beck and Frazier of the Executive Committee, and Mrs. Scott and Mr. Flack, who have been appointed special assistants to the Program Committee for Decennial arrangements. We were pleased to be informed by the Philadelphia Hospital Pharmacists Association, that a committee has been appointed to welcome us and make our convention week more enjoyable. This Committee consists of Mr. Benjamin Wexlar, *chairman* and Miss Thelma Connally, Sister Mary Gentilla Olender and Mr. Herbert Flack.

The extent of current opportunities for the hospital pharmacist to add to his store of information and professional skills can be realized by studying the programs of Institutes, Seminars and Chapter Meetings. Specifically, I would refer to the Hospital Pharmacy Seminar at University of Texas, in April; The Institute for Hospital Pharmacists, sponsored by The Catholic Hospital Association in May at Cleveland; and the Toronto Institute in June, which is sponsored by the ASHP, A.Ph.A., A.H.A. and the Canadian Society of Hospital Pharmacists and the Canadian Hospital Council. Some of us can remember when there were no organizations, no meetings, and no publications. It was then a rare treat to find someone who was interested in mutual or similar problems, so we could compare notes.

The growing custom whereby one hospital pharmacist visits the department of another for a few days is an interesting trend. I can personally recommend this method of exchange because I have participated in several arrangements of this kind. May I suggest that you send your assistant or staff pharmacist to see some other departments occasionally, too? When we trade ideas and information we all have more. That is the key to progress within the Affiliated Chapters.

To my knowledge, there never was a time when cooperation between the various branches of pharmacy has been so apparent as it is today. Goodwill is a priceless ingredient which usually costs nothing more than common courtesy. The reward for courtesy often amounts to success.

The ASHP is fortunate to have so many boosters within the organization. We recognize also, the many friends of the Society who represent all branches of pharmacy and the allied health professions. We are grateful for the assistance and encouragement which the Society has received in various ways and on many occasions during the past decade. We trust that our objectives and activities will continue to deserve such support in the future.

# A.S.H.P. AFFILIATES

The WESTERN NEW YORK CHAPTER OF THE ASHP, formerly known as the Buffalo Chapter, has recently been reorganized. Speakers at the March meeting were Dr. A. B. Lemon, Dean of the Buffalo School of Pharmacy, who discussed "Professional Pharmacy;" Mr. M. Monteith of the Veterans Administration Hospital, who presented a discussion of "Professional Pharmacy;" and Mr. M. Bongiovanni, E. R. Squibb, who spoke on "'Squibb Policy of Detailing Hospitals."

Officers of the Western New York Chapter are: Melvin Monteith, president; E. C. Kaznowski, vice-president; Sylvia Torre, secretary; and Sister Mary Lydia, treasurer.

The March 12 meeting of the SOUTHERN CALIFORNIA CHAPTER OF THE ASHP was held at the Queen of Angels Hospital in Los Angeles. "Public Relations and the Hospital Pharmacy" was the subject presented by Mr. Daniel Raschall, public relations consultant.

Included on the business agenda was a report by Mr. Hitzelberger on the types of meetings most desired by the membership; a discussion of the highlights of the meeting of the ASHP Executive Committee by Charles Towne; a report on membership activities by Sister Mary Junilla; and plans for contributing to the Decennial Fund.

The program of the March 20 meeting of the MIDWEST ASSOCIATION OF SISTER PHARMACISTS included a paper on "Treatment of Burns" and one on "Spiritualizing Our Service." Discussions covered the report requested by the national chairman of the Committee on Narcotic Regulations and plans for a project. The meeting was held at St. Elizabeth Hospital in Chicago with twenty members and nine guests present.

The annual meeting of the OHIO SOCIETY OF HOSPITAL PHARMACISTS was held in conjunction with the convention of the Ohio Hospital Association in Cleveland on April 1 and 2. Reports were received and the following papers presented at the Tuesday meeting: "Public Relations and Hospitals" by William Slabodnick, chief pharmacist at Massillon City Hospital, Massillon; "Drugs Used in Oral Surgery" by Edward Reiter, chief of the Department of Oral Maxillo Facial Surgery, Mt. Sinai Hospital, Cleveland; "Treatment of Diabetes" by O. P. Allen, M.D., diabetic specialist, Akron; and "Pharmaceutical Jurisprudence" by Patrick Donnelly, Ph.G., L.L.B., Medical Service Representative of Eli Lilly and Company. The program on Wednesday consisted of a four-panel workshop, a gadget display and a luncheon.

Officers of the Ohio Society for the 1952-1953 term are President Neal Johnson, Springfield City Hospital, Springfield; President-Elect Russell Lovell, City Hospital, Akron; Vice-President Mrs. Elnorah Drury, Alliance City Hospital, Alliance; Secretary Harriett Finney, Mansfield Hospital, Mansfield; and Treasurer Howard E. Schneider, Mt. Carmel Hospital, Columbus.

The NORTH CAROLINA SOCIETY OF HOSPITAL PHARMACISTS has been accepted as an affiliated chapter of the ASHP. The organization meeting, held in Charlotte on March 29, was attended by Mrs. Lillian Price and Miss Johnnie Crotwell, president and secretary respectively of the Southeastern Society. The Constitution and By-Laws were adopted at this meeting and the group of eighteen members voted to affiliate with the national organization. Officers of the North Carolina Society are President Gilbert Colina, Mercy Hospital, Asheville, N. C.; Vice-President Ernest W. Rollins, North Carolina Baptist Hospital, Winston Salem, N. C.; Secretary Miss Halcyone B. Collier, St. Joseph's Hospital, Asheville; and Treasurer William W. Taylor, University of North Carolina, Chapel Hill.

"Various Laboratory Tests Used for the Detection of Disease," was discussed by Dr. John J. Anthony at the February 21 meeting of the WESTERN PENNSYLVANIA SOCIETY OF HOSPITAL PHARMACISTS. The March 20

meeting included a symposium—A Day in the Pharmacy—covering activities in the Veterans Administration hospital, in a civilian hospital and in a clinic and public health center. Helpful suggestions were received by comparing the procedures used in the various type hospitals.

The speaker for the March 11 meeting of the HOSPITAL PHARMACISTS ASSOCIATION OF GREATER ST. LOUIS was Mr. Fred Nehring of E. R. Squibb. He discussed "Insulin and Diabetes." Announcement was made that representatives of the hospital pharmacy group had been invited to attend the next meeting of the St. Louis Medical Society and the following were appointed: Oliver Steppig, *chairman;* Sister Berenice; and Mrs. Florence Mueller. Other business covered included appointment of a Project Committee and the Historical Committee and consideration of the revised Constitution.

The University of Wisconsin School of Pharmacy conducted a one-day Professional Conference for the WISCONSIN SOCIETY OF HOSPITAL PHARMACISTS on March 22. The meeting was held at the University Extension Building in Milwaukee with 21 pharmacists participating.

The conference consisted of two sections—a lecture period during which the theoretical aspects of preparing dermatological vehicles was covered in talks by Dr. Louis Busse and Dr. Dale Wurster; and a practical workshop during which time the participants compounded the preparations discussed. At the close of the meeting certificates were presented to all those who participated.

Sister Gladys Robinson was re-elected president of the Wisconsin Society at the April 19 meeting. Other officers elected for the new year are Vice-President Ed Froncek, Deaconess Hospital, Milwaukee, and Secretary-Treasurer Eloise Kramp, Milwaukee Hospital. The speaker for the April meeting held at Milwaukee Hospital was Dr. James Bookhamer, chief medical anesthesiologist at the hospital.

Mr. John Murphy, chief pharmacist at Massachusetts General Hospital, was elected president of the MASSACHUSETTS SOCIETY OF HOSPITAL PHARMACISTS at the March 27 meeting. Other officers are Mrs. Ethel T. Pierce, vice-president; Miss Ann Varvas, secretary; and Sister Mary Edward, treasurer.

The ARIZONA SOCIETY OF HOSPITAL PHARMACISTS has been active in assisting hospital administrators in securing pharmacists as well as offering consultant services. At the March 16 meeting held at St. Mary's Hospital in Tucson, plans were made to hold a panel discussion at the convention of the Arizona Pharmaceutical Association being held in Nogales on April 21. Participants on the panel were to be David Axelrod, Eli Schlossberg, Mrs. Myrdas Brewer and Harry Ferguson.

Official delegates of the AKRON AREA SOCIETY OF HOSPITAL PHARMACISTS to the March meeting of the Ohio Society were Wm. McElroy and Jack Hovis.

*Workshop held at Professional Conference of Wisconsin Society*

*Southeastern Society Meets in conjunction with Hospital Conference. Left to right: Herbert L. Flack, Evelyn Peacock, E. W. Rollins, Lillian Price, Don E. Francke, Johnnie Crotwell and J. R. Cathcart.*

The ninth annual meeting of the SOUTHEASTERN SOCIETY OF HOSPITAL PHARMACISTS was held in conjunction with the Southeastern Hospital Conference at Hotel Biltmore in Atlanta, April 16, 17 and 18. Over 100 hospital pharmacists and interested persons representing all of the Southeastern states were present. The principal speaker was Dr. Don E. Francke who represented the hospital pharmacists on the program of the Southeastern Hospital Conference speaking on "Pharmacy Services in Small Hospitals." Other speakers and subjects discussed included the following:

"Pharmacy in Civilian Defense" by Charles Eberhart, M.D. chief of Medical Aid Division of Civilian Defense, Metropolitan Atlanta Area, Atlanta, Ga.

"Spans and Tweens" by J. Robert Cathcart, pharmacy director, The Delaware Hospital, Wilmington, Del.

"Further Experiences with the Parentsol System" by Herbert L. Flack, chief pharmacist, Jefferson Medical College Hospital, Philadelphia, Pa.

"C. Lewis Diehl, The Great Southern Pharmacist" by Dr. C. Lee Huyck, director, Division of Pharmacy, Howard College, Birmingham, Ala.

"Geriatrics in Hospital Pharmacy" by Terry B. Nichols, chief pharmacist, VA Domicilliary, Thomasville, Ga.

"Use of Radioisotopes in Hospital Pharmacy" by William P. O'Brien, III, chief pharmacist, Touro Infirmary, New Orleans, La. (presented by Miss Valerie Armbruster, chief pharmacist, Charity Hospital, New Orleans).

"Manufacturing in Hospital Pharmacy" by I. Thomas Reamer, chief pharmacist, Duke Hospital, Durham, N. C.

"General Hospital Routine" by Miss Mary Wernersbach, chief pharmacist, Mount Sinai Hospital, Miami Beach, Fla.

"Pricing of Drugs" by Howard D. Clem, chief pharmacist, George K. Lanier Memorial Hospital, Langdale, Ala.

Special entertainment consisted of a barbecue, breakfasts, dinner, luncheons, friendship party, banquet, dance and special photography sponsored by the various pharmaceutical companies. A tour of the Georgia Baptist Hospital, Emory University Hospital and the city of Atlanta was sponsored by the Georgia Society of Hospital Pharmacists and the Atlanta Women Pharmacists.

The NEW JERSEY SOCIETY OF HOSPITAL PHARMACISTS met at the Lutheran Memorial Hospital in Newark on February 21 with Vice-President Mrs. Evelyn Carlin presiding. The group was welcomed by the superintendent of the hospital, Mr. Albin Oberg. Included on the program was a report on the recent meeting of the American College of Apothecaries by Miss Mildred Avantario and a motion picture on "Heart Surgery in Coarctation of the Aorta."

Guest speaker at the February 12 meeting of the NORTHERN CALIFORNIA SOCIETY OF HOSPITAL PHARMACISTS was Mr. Fred Thistlewaite, Manager of Biological and Hospital Sales for Parke, Davis and Company. He spoke on "Pharmacy at Its Highest Level—Hospital Pharmacy."

Business covered included the activities of the Project Committee; a report from the chairman of the Placement Committee, Mr. Francis Spinelli; and plans for a program and a booth at the convention of the Association of Western Hospitals, meeting in San Francisco in May.

A panel on "Manufacturing of Medicinals" with Arnold Dodge as chairman, was included on the program of the March meeting of the California Society. Participants were Mr. Stephen Dean, Jerry Yalon and Francis Spinelli.

At the March meeting of the GREATER NEW YORK CHAPTER OF THE ASHP, Dr. Steven Brodey, research physicist at Jewish Memorial Hospital in New York, discussed radioactive isotopes currently used in medicine. Business covered included a report of the Project

Committee, plans for a field trip to the Winthrop-Stearns Research Laboratory in Rennselaer and consideration of presenting a gift to the Decennial Fund. The group met at St. Clare's Hospital.

At the April 15 meeting of the AKRON AREA SOCIETY, plans were made to stimulate organization of other groups to affiliate with the Ohio Society and the national organizations; the formation of speaking groups to further hospital pharmacy; and arranging an award to be given to a deserving student in hospital pharmacy. Other business covered included a report of the recent Ohio meeting by Leon Bailey and an informal discussion of the Durham Humphrey regulations and the Fair Trade bill.

The GEORGIA SOCIETY OF HOSPITAL PHARMACISTS headed by Miss Johnnie Crotwell, chief pharmacist at Georgia Baptist Hospital in Atlanta, has been approved as an affiliated chapter of the national organization. The officers, including President Crotwell, Vice-President Mrs. Lillian Price, Secretary Terry B. Nichols, and Treasurer Heard Harris, were installed at a meeting in Atlanta on April 16, just prior to the opening of the annual meeting of the Southeastern Society. Fourteen hospital pharmacists were accepted as charter members of the Georgia Society.

The FLORIDA SOCIETY OF HOSPITAL PHARMACISTS met in conjunction with the state Pharmaceutical Association's convention in Miami Beach on May 19, 20 and 21.

The Fourth Annual Hospital Pharmacy Seminar of the College of Pharmacy of The University of Texas was held on the campus in Austin, TEXAS, April 21 and 22. Forty-five hospital pharmacists were registered as participants of the Seminar. Guest speakers were Jerome M. Yalon, University of California Hospital, San Francisco, Calif., who spoke on "Purchasing in the Hospital Pharmacy," and Anna D. Thiel, Jackson Memorial Hospital, Miami, Fla., whose topic was "My Experience With Records of Value in Hospital Pharmacy." Other speakers were J. F. Badgett, Merck Company, Inc., Rahway, New Jersey; L. J. Barrett, Chas. Pfizer & Co., Inc., Brooklyn, N. Y.; Roy Wilmesmeier, Blue Cross of Texas, Houston; Henry M. Burlage and John E. Davis, University of Texas; Arthur Ruskin, M. D., The University of Texas—Medical Branch, and Howard Mathison, Fort Worth. Frederick V. Lofgren of the University of Texas was chairman of the Seminar.

A special feature of the program was a Workshop with reports on the following topics: Barbiturate Control; After Hour Emergency Requests; Refilling of Prescriptions; and How Much Freedom Should Be Allowed the Detail Man Around the Hospital? Paul T. Rees of Bristol Laboratories, Inc., was moderator of the workshop.

Hospital Pharmacists in RHODE ISLAND met in Providence on April 1 to organize a chapter of the ASHP. Messages were received from Mr. John Murphy, president of the Massachusetts Society; from Miss Esther I. Clark, past-president of the Massachusetts group; and from Francis Sullivan, president of the Connecticut Socitey.

Officers were elected at the second meeting held at the VA Hospital in Davis Park on April 17. The president is Anthony Longo, a charter member of the national organization. He will serve along with Vice-President Robert Daigle, Corresponding Secretary Edward Gilberti, Recording Secretary Doris Celuzza, and Treasurer Victor Canaipi.

*Fourth Annual Hospital Pharmacy Seminar — University of Texas*


# Contributors to the Decennial Fund

MARCH 30 TO MAY 15

Interest on the part of many individuals and affiliated chapters in contributing to the "Decennial Fund of the ASHP" is encouraging to all hospital pharmacists. Made possible by these contributions will be the opportunity to have outstanding foreign hospital pharmacists participate in the Decennial meeting, and also, publication of the Society's history. Should you wish to participate in this phase of the ASHP's Decennial Year, contributions may be forwarded to Sister Mary Raphael, treasurer, ASHP, St. Vincent's Hospital, Sioux City, Ia.

**OUR GOAL**

EVERY MEMBER A CONTRIBUTOR

| | *Dollars* | *Members* | *Affiliated Chapters* |
|---|---|---|---|
| Goal | $6000 | 1850 | 30 |
| Contributed | 1500 | 175 | 15 |
| | 4500 | 1675 | 15 |

**ASHP MEMBERS**

Armbruster, Valerie, Charity Hospital, New Orleans, La.
Bailey, Leon, 4022 Euclid Blvd., Youngstown, Ohio
Berger, Catherine, 100 Clifton Place, Jersey City, N.J.
Blumer, Dorothy, 443 W. Evergreen, Youngstown, Ohio
Budler, Willa, Sharon Hospital, Sharon, Pa.
Busick, C. L., St. Joseph's Hospital, Stockton, Calif.
Carlin, Evelyn M., 355-15th Ave., Paterson, N. J.
Colina, Gilbert, Mercy Hospital, Charlotte, N. C.
Cook, Louise, 1836 South Ave., La Crosse, Wis.
Crutcher, Owen L., Johnson City, Tenn.
Deeb, Edward N., Veterans Administration, Rutland Heights, Mass.
Dellande, Armand, City Infirmacy Hospital, St. Louis, Mo.
Drury, Elnorah, Alliance City Hospital, Alliance, Ohio
Finney, Harriett, Mansfield General Hosp., Mansfield
Fischelis, Robert P., 4000 Cathedral Ave., Washington 16, D.C.
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Greene, Joseph, 5435 Southern Blvd., Youngstown, Ohio
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Hasenbalg, Catherine, 100 Clifton Place, Jersey City, N. J.
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Holaday, Chase, 1245 Hayes, Apt. 4, San Francisco, Calif.
Hooper, Alice, 5152 Oakland St., Los Angeles 32, Calif.
Hovis, Jack, 253 Vine St., Salem, Ohio
Jack, Bernice, 604 Broadway, Youngstown, Ohio
Johnston, Wm. L., Robert Packer Hospital, Sayre, Pa.
Jeffers, C. M., Scott & White Hospital, Temple, Texas
Kamdin, Daisy, Victory Memorial Hospital, Waukegan, Ill.
Kercher, Edwin H., 4731 Cedar Ave., Philadelphia 43, Pa.
Knepp, Irene, 6 Dreisbach Drive, Akron, Ohio
Longo, Anthony, 125 Smith St., Cranston 5, R. I.
Lovell, Russell F., 476 Wirth Ave., Arkron, Ohio
McElroy, Wm., 142 Clemmer Ave., Akron, Ohio
Marsh, George, Smithtown Branch, L.I., N.Y.
Mink, Theodore, Peoples Hospital, Akron, Ohio
Morgan, Mary, 919 Baughman St., Akron, Ohio
Mossman, Leo W., 608 First Ave., Gallipolis, Ohio
Nielson, Paul, 100 Broadway, Hillsdale, N. J.
Niemeyer, Gloria, 2426 19th St., N.W., Washington, D. C.
Pesa, Ludwig, St. Mary's Hospital, Passaic, N. J.
Richards, Anna C., Mountainside Hospital, Montclair, N. J.
Roba, Elvira, 615 16th St., Munhall, Pa.
Rogan, Jane, Evangelical Deaconess Hospital, Detroit, Michigan
Rollins, E. W., North Carolina Baptist Hospital, Winston-Salem, N.C.
Rudi, Francis, 3553 Crittenden St., St. Louis, Mo.
Safford, Ruth, R.F.D. 1, Perry, N. Y.
Seal, Charles E., Muhlenberg Hospital, Plainfield, N. J.
Sickafoose, Jeanette T., Rt. 1, East Sparta, Ohio
Sisk, Thomas E., 2140 E. Erie Ave., Lorain, Ohio
Sister Eva Marie, St. Mary Hospital, Cincinnati, Ohio
Sister Gladys Robinson, Milwaukee Hospital, Milwaukee, Wisconsin
Sister Hildegarde, St. Vincent Hospital, Taylorville, Ill.
Sister M. Louise Landry, Mercy Hospital, Portland, Maine
Sister Mary Oswalda, St. Joseph & Childrens Hospital, Scranton, Pa.
Slabodnick, William, Massillon City Hospital, Massillon, Ohio
Stimson, Russell, 1269 Cleveland Hgts., Cleveland, Ohio
Stone, Ralph, Vanderbilt Hospital, Nashville, Tenn.
Stone, Robert, South Highlands Infirmary, Birmingham, Ala.
Taylor, Laura, 2707 Lincoln Park Ave., Los Angeles, Calif.
Taylor, R. L., 4608 N. Chelsa Lane, Bethseda. Md.
Vesey, Edward, 193 Buttercup Lane, Levittown, L.I. N.Y.
Weber, I. A., 7132 E. End. Ave., Chicago 48, Ill.
Wegemer, Norbert, Little Traverse Hospital, Petoskey, Mich.
Wittenberg, Vera, P. O. Box 433 W. Van Buren, Chicago 80, Ill.
Wright, Herbert G., 210 Wescott St., Syracuse, N. Y.

**AFFILIATED CHAPTERS**

Connecticut Society of Hospital Pharmacists
Georgia Society of Hospital Pharmacists
Massachusetts Society of Hospital Pharmacists
Memphis Chapter of the American Society of Hospital Pharmacists
Midwest Association of Sister Pharmacists
New Jersey Society of Hospital Pharmacists
Northern California Society of Hospital Pharmacists
Southeastern Society of Hospital Pharmacists
Southern California Chapter of the American Society of Hospital Pharmacists (Chapter contribution and contributions from individual members)
Texas Society of Hospital Pharmacists
Toledo Society of Hospital Pharmacists
Wisconsin Society of Hospital Pharmacists

# NEWS ITEMS

### Tri-State Hospital Assembly Pharmacy Section

MR. ALLEN V. R. BECK, chief pharmacist at the Indiana University Medical Center, Indianapolis, Ind., was re-elected chairman and Miss Patricia Messner, Milwaukee Hospital, Milwaukee, Wis. was re-elected secretary of the Hospital Pharmacy Section of the twenty-second annual Tri-State Hospital Assembly held in Chicago on April 28, 29, and 30. A large number of hospital pharmacists attended the three afternoon and one morning scheduled sessions.

At the first meeting Dr. A. David MacKinley, acting medical director at the Indiana University Medical Center, presented a talk titled "Cooperation with the Medical Staff," stressing the point that for best relations, cooperation must go both ways between the pharmacist and the doctor. Mr. George Wren, Superintendent, Gary Methodist Hospital, Gary, Ind., spoke on "The Administration Looks for Cooperation," emphasizing that the basis of cooperation should be the welfare of the patient.

"The Newer Approved Drugs and Those Drugs now Under Clinical Investigation" was the title of the paper presented by Dr. Paul L. Wermer, assistant secretary, Council on Pharmacy and Chemistry of the A.M.A. Mr. Paul Parker, chief pharmacist Billings Hospital, University of Chicago, gave an interesting talk on "The History of Hospital Pharmacy and the ASHP," now celebrating its Decennial.

On the second day Dr. Dale Wurster, assistant professor of pharmacy, University of Wisconsin, Madison, Wis., spoke on "Newer Ointment Bases and Emulsifying Agents."

The third session was opened by Mr. Bernard Carr, administrative assistant, Indiana University Medical Center, who spoke on "No Credits—No Returns," explaining a new system for dispensing and charging patients for medicines. "What Work Simplification and M.T.M. can do for Hospitals" was the subject presented by Mr. Serge Birn, President of the Serge Birn Company, consulting management engineers, Louisville, Ky.

Sister Mary Blanche O.S.F., chief pharmacist at Sacred Heart Sanitarium, Milwaukee, Wis., presented a paper on "Point Rating System for Hospital Pharmacies," as applied to the *Minimum Standard for Pharmacies in Hospitals.* The last session was a panel discussion on "Pricing Pharmaceuticals within the Hospital," with Mr. George Wren, Dr. A. David MacKinley, Patricia Messner, Mr. Allen V. R. Beck, Mr. Paul Parker and Mr. Bernard Carr participating.

### Dr. Crosby Appointed Director of Accreditation Commission

Edwin L. Crosby, M.D., president-elect of the American Hospital Association, has been appointed executive director of the Joint Commission on Accreditation of Hospitals. Dr. Crosby, who has resigned his directorship of The Johns Hopkins Hospital, will assume his new position September 1. This appointment was made by the Board of Commissioners representing the American Hospital Association, the American Medical Association, the American College of Physicians, the Canadian Medical Association and the American College of Surgeons.

The accreditation commission, under the directorship of Dr. Crosby, will set standards, arrange inspections and officially accredit hospitals. It is hoped that the *Minimum Standard for Pharmacies in Hospitals* will be officially accepted by this body and will be a consideration when accrediting hospitals.

### AHA Issues Administrators Guide

The June "Administrators Guide" issue of *Hospitals* will again present information of pertinent interest to hospital pharmacists. It will follow last year's pattern containing the four big sections—Statistical Guides, Management Guides, Guide to Hospitals and Guide to Organizations. The Management Guides section will present operating facts, figures, tables, and check-lists for the pharmacy, laundry, engineering and maintenance department, food service, purchasing and housekeeping. A new sub-section will feature checklists on the broader aspects of administration.

### Beck Representative to AAAS

President Frazier has appointed Allen Beck, chief pharmacist at Indiana University Medical Center Hospital in Indianapolis, as the Society's representative to the Subsection on Pharmacy of the American Association for the Advancement of Science. As such, Mr. Beck will be responsible for hospital pharmacy papers to be presented at the 1952 annual meeting which is being held in St. Louis in December. Hospital pharmacists interested in presenting a paper at this meeting should notify Mr. Beck before September 1, giving the title of the paper along with an abstract.

This will be the first time the ASHP will participate in the AAAS meeting as an associated Society and it is hoped that a large group of hospital pharmacists will attend the meeting.

**Internship Announced**

Graduate work in hospital pharmacy leading to an M.S. degree will be offered at the University of Texas College of Pharmacy this fall. There will also be available two Assistant Pharmacist Internships in the Student Health Service for those interested in the academic program. Persons wishing to enter the school should contact Dean Henry Burlage, The University of Texas College of Pharmacy, Austin 12, Texas.

**Taylor Accepts North Carolina Post**

William Taylor has been appointed chief pharmacist at the University Hospital in Chapel Hill and instructor on the staff of the School of Pharmacy. Mr. Taylor will receive his doctorate at the University of North Carolina and has recently had experience in hospital pharmacy at Duke Hospital in Durham.

**Hospital Pharmacists Needed**

QUESTION: *May I have your opinion as to how many pharmacists should be employed in a hospital pharmacy on the basis of the bed capacity of the hospital:—S.B.,* WYO.

ANSWER: It is difficult to give any really reliable guide as to just how many hospital beds can be properly serviced by one pharmacist. So many things enter into the situation. As an example: Does the hospital have an active outpatient clinic for poor people and does it have an active pay outpatient clinic? If such clinics are in operation the volume of work in the pharmacy for outpatients might exceed the volume of work for inpatients.

Many people who have studied this problem over a long period of time feel that a hospital with only 75 to 100 beds cannot afford to be without the fulltime services of a qualified pharmacist. As a general rule these small hospitals, unless they have an extremely active and high volume outpatient clinic, could not keep a pharmacist busy all of the time. However, it is felt that the pharmacist could take on such other duties as purchasing or chief of the storeroom so that his time would be well occupied. A pharmacist in a hospital of 75 to 100 beds, combining a few other duties with his pharmaceutical job, probably could repay the hospital many times over, even though he is paid a good adequate salary. The savings inherent in having a pharmacist in a hospital are great.

One pharmacy in a hospital of about 500 beds with an outpatient visit volume of about 150 a day has three fulltime pharmacists who are kept very busy.

Standard plans have been developed for hospital pharmacies of 50, 100 and 200 bed general hospitals by the Division of Hospital Facilities, U. S. Public Health Service. These plans were worked out in cooperation with the American Pharmaceutical Association and the American Society of Hospital Pharmacists. They were printed in THE BULLETIN OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS in the January-February, and May-June issue of 1950. Reprints are available from the Division of Hospital Facilities, Public Health Service. This same pamphlet contains the *Minimum Standards for Pharmacies in Hospitals.*—E. W. Jones

—From *Modern Hospital 78*:47, No. 3 (Mar.) 1952.

**Course in Hospital Pharmacy Offered**

The Southwestern State College School of Pharmacy at Weatherford, Oklahoma is this year offering for the first time a course in hospital pharmacy. Nineteen seniors are enrolled in the course which is being taught by Dr. Charles Schwartz, who was in the Educational Training Division of the Veterans Administration in Washington, D. C. before joining the faculty at Southwestern. The course has been established to meet the growing need for pharmacists trained in hospital pharmacy. As a part of their laboratory training the students visit hospitals in the area.

**Joe Vance Promoted**

Joe Vance, assistant administrator and chief pharmacist at South Highland Infirmary in Birmingham, Ala. has been promoted to administrator. Mr. Vance has been active in Society affairs, particularly in the Southeast, and is also editor of the pharmacy section of *Southern Hospitals.* He will continue as chief pharmacist in which capacity he will be assisted by Robert Stone.

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ELI LILLY and Company, in accordance with its long established policy, is replacing all Lilly products in pharmacies and hospitals ravaged by the flood in the Missouri and Mississippi River Valleys.

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The *Minimum Standard for Pharmacies in Hospitals* is reprinted in *The Pharmaceutical Journal of New Zealand,* January 31, 1952.

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# NEW MEMBERS

MAY 1, 1952

ALABAMA
Conerly, Jean, Andalusia
Lancaster, Mary, Steppville
Ward, Meredith O'Keene, V. A. Hospital, Tuscaloosa

ARIZONA
Cheney, Evelyn D., 549 W. San Juan Ave., Phoenix
Pepera, Joseph B., 537 S. Country Club Dr., Mesa

CALIFORNIA
Ball, Joseph E., 539 N. Hobart Blvd., Los Angeles
Barry, Betty Jean, 537 Cedar, Vallejo
Boyd, Grace W., 545 - 28th Ave., San Francisco
Fahrner, Laurel A., 145 Irving, Apt. 6, San Francisco
Haley, Don J., 844 - 14th St., Manhattan Beach
Kohatsu, Mitsuko, 2626 Kenwood, Los Angeles
Lovell, Ludwik, 246 S. Rexford Dr., Beverly Hills
Munson, Mary L., 1338 Kains Ave., Berkeley
Nichols, Harland A. Jr., 1991 - 46th Ave., San Francisco
Puritz, Jacob J., 3827 Sawtelle Blvd., Culver City
Schwartz, Melvin B., 2532 Roscomare Rd., Los Angeles
Sister Miriam Franik, Buena Vista & Park Hill Aves., San Francisco
Studer, Francois D., 4522 W. 15th Pl., Los Angeles (A)
Villani, Joseph R., 9860 Primrose Dr., La Mesa
Yount, Sylvia A., 432 Calle Mayor, Redondo Beach

COLORADO
Keifer, John S., 3514 S. Broadway, Englewood
Rivers, Jack H., 244 Libby Hall, Baker Residence Hall, Univ. of Colo., Boulder (A)

CONNECTICUT
Hertz, Shirley G., 663 Clinton Ave., Bridgeport

DISTRICT OF COLUMBIA
Bliven, Charles W., School of Pharm., G. W. Univ., Washington (A)

FLORIDA
Mahrt, Henry W., 1129 Golfview Ave., Orlando
Monserrate, Sotie, Mount Sinai Hospital, Miami
Saron, Robert, Mound Park Hospital, 7th St. & 6th Ave., S., St. Petersburg
Werner, Mary A., 24 N. Glenwood St., Orlando

GEORGIA
Cook, Irene H., 1364 Villa Dr. N. E., Atlanta
Cunningham, Cornelia, 35 Linden Ave. N. E., Atlanta
Fuller, Ruth B., 3084 Gaylemont Dr., Decatur
Harris, Heard, Thomaston
Hilliard, Marian, 105 Rumson Rd., Apt. 4, Atlanta
Nichols, Terry B., V. A. Domicilliary, Thomaston
Williams, Henry T., Chamblee

IDAHO
Perkins, Paul C., 1002 - 15th Ave., Lewiston

ILLINOIS
Doerr, Dale W., 5839 W. Roscoe St., Chicago (A)
Lev, Clarence C., 9970 Van Vlissingen Rd., Chicago
Raff, Allan M., 3249 Eastwood Ave., Chicago (A)
Sister M. Theodora Wessel, 372 N. Broadway, Joliet

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Butz, Elmer D., 2018 Oxford St., Fort Wayne
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Sperandio, Glen J., 5-3 Ross Ade Dr., West Lafayette
Wissman, William O., 2311 John, Fort Wayne
Wood, Kenneth M., 2511 S. Penn St., Indianapolis

IOWA
Coontz, Anthony P., 236 Hillside, Waterloo
Stava, Edward J., 915 - 25th St., S. E., Cedar Rapids
Terry, Meryl L., 1140 Hammond Ave., Waterloo

KANSAS
Charles, G. Keeney, 1506 Main, Parsons (A)
Cunningham, Vernette E., 331 Oakwood Dr., Wichita
Lakin, Everett D., 712 W. 5th, Newton
Lederer, Harry E., 732 Main St., Osawatomie

LOUISIANA
Grace, William D. Jr., 316 Wm. David Pky-West, New Orleans (A)
Michel, Gerard A., 4705 Duplessis St., Apt. B, New Orleans
Thompson, John F., 310 Friedrichs Ave., New Orleans (A)

MARYLAND
Cox, Ens. Richard M., MSC, USN, U. S. Naval Hospital, Bethesda
Demarest, Dudley A., 2904 Brighton St., Baltimore
Roge, Lt. Albert H., 3309 Oberon St., Kensington
Trageser, Jacqueline G., 2813 Bauernwood Ave., Baltimore

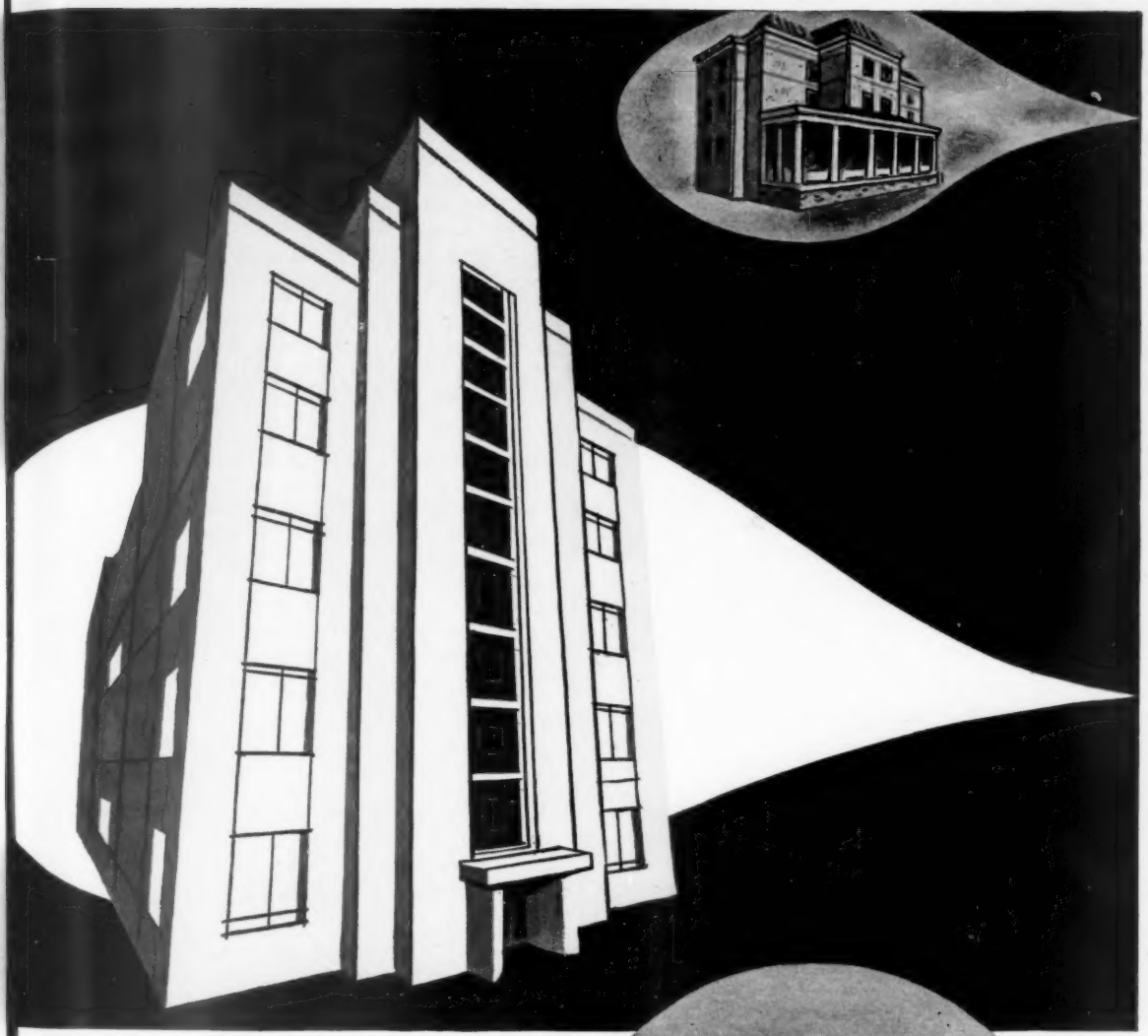
MASSACHUSETTS
Ciampa, Robert A., 58 Trowbridge St., Arlington
Gasdia, Salvatore, 34 Mystic Ave., Somerville
Goldfarb, Elliott, 148 Seaver St., Roxbury
Mooney, Mary T., 27 Paul Gore St., Jamaica Plain
Pacella, Philip P., 198 Manchester St., Boston
Santoro, Ernest L., 30 Park St., Lawrence
Shea, Margaret C., 18 Thomas Park, South Boston
Spongberg, Lillian, 58 Cushing St., Medford
Vander Wyk, Raymond W., 179 Longwood Ave., Boston
Yanis, Martin, 16 Donald Rd., Stoughton

MINNESOTA
Eischens, Beatrice I., 4400 Columbus Ave., So., Minneapolis
Harries, David B., 4400 Washburn Ave. So., Minneapolis
Hartmann, C. Arthur, 310 E. 25th St., Minneapolis (A)
Lindsay, Swayne H., c/o St. Mary's Hospital, 2600 S. 6th, Minneapolis

MISSOURI
Beck, Ernest G. C., 2317 Hilton Ave., Brentwood
Bernau, Robert J., 6202 Wagner, St. Louis
Block, Jacquelyn, 6267A Delmar, St. Louis
McBride, Margaret A., c/o Barnes Hospital Pharmacy, St. Louis
Sister Mary Regina, St. Anthony's Hospital, 3520 Chippewa St., St. Louis

MONTANA
Barnes, Leonard J., School of Pharmacy, M.S.U., Missoula (A)

NEBRASKA
Gibb, S. Joan, 6720 N. 24th St., Omaha



# *Liver extracts* Lederle

LIVER INJECTION and LIVER INJECTION CRUDE *Lederle* have been known to the medical profession for a quarter century as possessing the highest possible attributes of potency and toleration.

LIVER EXTRACTS are available in many strengths and in various forms, with or without folic acid. They are not only useful for the treatment of the megaloblastic anemias, including pernicious anemia, but are widely used for metabolic stimulation and, intravenously, for the treatment of hepatic cirrhosis. For the treatment of the latter disease, INTRAHEPTOL* Liver Concentrate *Lederle* is especially prepared for intravenous administration and may be used in conjunction with DELPHICOL* Tricholine Citrate with Methionine *Lederle* given orally.

*Lederle* liver extracts are used in thousands of hospitals and clinics throughout the world; accepted as setting the highest standard of excellence.

**LIVER INJECTION U.S.P.** 10 micrograms
(Refined Solution Liver Extract 10 U.S.P. Units)
Vials of 10 cc. and 30 cc.
**LIVER INJECTION U.S.P.** 20 micrograms
(Solution Liver Extract Concentrated 15 U.S.P. Units)
3 vials of 1 cc.; vials of 10 cc.
**LIVER INJECTION CRUDE U.S.P.** 2 micrograms
(Crude Solution Liver Extract 2 U.S.P. Units)
Vials of 10 cc.
**LIVER INJECTION U.S.P. with FOLVITE* Folic Acid**
Liver Injection 20 micrograms with Folic Acid 5 mg.
(FOLVITE with Liver Extract 15 Units)
3 vials of 1 cc.; vials of 10 cc.
**LIVER INJECTION CRUDE with FOLVITE Folic Acid**
Liver Injection Crude 1 microgram with Folic Acid 1 mg.
(FOLVITE with Liver Extract, Crude 1 Unit)
Vials of 10 cc. and 30 cc.
**LIVER INJECTION CRUDE with FOLVITE Folic Acid**
Liver Injection Crude 2 micrograms with Folic Acid 2 mg.
(FOLVITE with Liver Extract, Crude 2 Units)
Vials of 10 cc. and 30 cc.
**INTRAHEPTOL Liver Concentrate *Lederle***
Vials of 10 cc.
**DELPHICOL Tricholine Citrate with Methionine *Lederle***
Bottles of 16 fluid ounces.
*Reg. U. S. Pat. Off.

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Paolella, Nick E., Box 2339, Rte. 2, Bellevue (A)
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McNab, T. A., 203 Fairleigh Ave. S., Hamilton, Ont.
Morris, Jack A., 1582 W. 59th Ave., Vancouver, B. C.
Stewart, Douglas J., 11117 - 81st Ave., Edmonton, Alta.

# POSITIONS IN HOSPITAL PHARMACY

## POSITIONS OPEN

POSITION open for hospital pharmacist in new 160 adult bed hospital. Salary open and dependent upon qualifications. Write Administrator, Ashtabula General Hospital, Ashtabula, Ohio.

MISSOURI—Hospital in process of enlarging to 200 beds has opening for chief pharmacist beginning immediately. Pharmacy to have completely new equipment. Experience or training in hospital pharmacy essential. Starting salary $350.00. For further information contact Mr. Horace L. Burgin, Burge Hospital, Springfield 2, Missouri.

GEORGIA—Registered pharmacist, 500-bed general hospital. Position open in June. For further information write to Mrs. Betty Hull, Chief Pharmacist, Crawford W. Long Memorial Hospital, 35 Linden Ave., N. E., Atlanta, Ga.

The following openings in hospital pharmacy appeared in current issues of hospital publications. Anyone interested in the positions should write directly to the Agency indicated. A fee is charged when positions are secured through the services of a personnel agency.

PHARMACISTS—(a) 250-bed hospital, Midwest university city 50,000; to $5400. (b) 200-bed hospital, city 50,000, Chicago area; 40-hour week, good salary. Woodward Medical Personnel Bureau, 185 N. Wabash Ave., Chicago 1, Ill.

WANTED PHARMACISTS: (a) CHIEF; voluntary general hospital currently under construction; 400 beds; administrative ability, hospital experience required; university town, South. (b) STAFF; 300-bed hospital, unit of important medical center; college town, Midwest. (c) ASSISTANT or ASSOCIATE PROFESSOR of PHARMACY, state college; West. (d) STAFF; man or woman; one of leading hospitals, Chicago area. (e) Laboratories, pharmaceutical company; duties: analytical problems dealing with compounding of medicinal dosage forms, serving as technical advisor to clients; East. (f) STAFF; 250-bed hospital affiliated with university medical school; Southwest. (g) STAFF; recent graduate eligible; voluntary general hospital, 450 beds; suburban location, East. (Please send for an ANALYSIS FORM so we may prepare an Individual Survey for you.) Medical Bureau, Burneice Larson, Director, Palmolive Bldg., Chicago.

## POSITIONS WANTED

REGISTERED PHARMACIST—B.S. in Pharmacy and degree in Chemistry desires position as pharmacist-teacher. Three years' teaching experience. For further information write to J. C. Almond, Jr., 7739 1st Ave. So., Birmingham, Ala.

MAN WITH B.A. DEGREE in Education (College of the City of New York, 1936) and B.S. in Pharmacy (Philadelphia College of Pharmacy and Science, 1949) desires position as chief pharmacist. Three years' experience in hospital pharmacy. For further information contact Mr. Sydney Levitan, 450 Madison Ave., York, Pa.

PHARMACIST-TEACHER with B.S. and M.S. desires position in teaching and hospital pharmacy preferably in East. For further information write to Mr. Albert M. White, Univ. of Conn., College of Pharmacy, Storrs, Conn.

POSITION WANTED by experienced hospital pharmacist, excellent background and references. Prefer Southeast, West coast, Hawaii, or Washington, D. C. Contact L. J. Barnes, School of Pharmacy, M.S.U., Missoula, Montana.

REGISTERED PHARMACIST with Ph.G. and B.S. degrees desires position in general hospital in Florida. Experienced in both retail and hospital pharmacy and hospital administration. For further details write to Howard E. Fleischer, 8420 A Greenway Rd., Towson 4, Md.

WOMAN PHARMACIST registered in Pennsylvania and New Jersey desires position in hospital pharmacy. Has B.S. in Pharmacy from Duquesne University (1949) and two years' experience in hospital pharmacy. For further information write to Miss Marion V. Golden, 18 Seaman Ave., Hempstead, L.I., N.Y.

WOMAN PHARMACIST desires position in Chicago. Graduate of Montana State University (1949); three years' experience in hospital pharmacy. For further information write to Miss Sue Onimura, 4426 Pine St., Philadelphia, Pa.